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SAVERY COAL

Environmental Impact Statement

U. S. Department of the Interior Bureau of Land Management Rawlins District, Wyoming

I 1.98:

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

State Office
P. O. Box 1828
Cheyenne, Wyoming 82001

IN REPLY REFER TO
1792 (931)
Savery Project

NOTICE

The Bureau of Land Management (BLM) proposes to give further consideration to the entitlement of Gulf Oil Corporation to be issued a non-competitive Federal coal lease (or leases) for nine Preference Right Lease Applications (PRLA's), collectively known as the Savery Project. This "further consideration" alludes to completing the PRLA "processing" requirements, as described in 43 CFR 3430 for the Savery Project PRLA's. Specifically, this document is to fulfill the environmental analysis requirement (43 CFR 3430.3-2), which will provide the basis for completing the remaining processing steps (43 CFR 3430.4 through 3430.5-3). Two alternatives (development or mining and no developing or no mining) are analyzed in this draft environmental impact statement (EIS). The affected environment is described and the environmental impacts are documented.

The recently completed coal land use planning decisions for the Divide/ Overland Area in the BLM Rawlins District include recognition that the Savery Project Area should not be mined within the scope and time frame of the land use plan (15 to 20 years) or in the foreseeable future. The planning decisions also provide that if in the processing of the Savery PRLA's it is determined that the applicant is entitled to a Federal coal lease(s) on the area, the BLM will initiate negotiations for an exchange or other compensation to avoid mining of the area within the foreseeable future. Accordingly, BLM's preferred alternative is the no development alternative.

For further information contact: Gene Kolkman, Team Leader, Bureau of Land Management, P.O. Box 670, 1300 Third Street, Rawlins, Wyoming 82301, telephone (307) 324-7171.

Comments may be submitted to the above address until November 15, 1982. All comments will be considered. Those which raise questions or issues concerning the effects of the alternatives, present new data, or question facts or analyses will be responded to in the final EIS.

Sincerely yours,

Maxwell T. Lieurance
State Director

Enclosure

SAVERY PROJECT PREFERENCE RIGHT COAL LEASE APPLICATIONS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

CARBON COUNTY, STATE OF WYOMING
MOFFAT AND ROUTT COUNTIES, STATE OF COLORADO

Prepared By:

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

RAWLINS DISTRICT 1982

Cooperating Agencies:

MINERALS MANAGEMENT SERVICE

OFFICE OF SURFACE MINING

U.S. GEOLOGICAL SURVEY

DEPARTMENT OF AGRICULTURE
U.S. FOREST SERVICE

Mahlon T. Kiernan

STATE DIRECTOR

WYOMING STATE OFFICE

READEX FICHE

SUMMARY

This environmental impact statement analyzes the impacts of developing a 4 to 7 million ton per year subsurface coal mine, and presents an analysis of the Bureau of Land Management's preferred alternative that no mining should occur in this area in the foreseeable future.

This environmental impact statement is based on the Savery Site-Specific Environmental Report (1982) and the Rawlins District land-use planning decisions for coal in the Divide Resource area.

The proposed coal mine consists of nine preference right lease applications, which belong to Gulf Oil Corporation, on the Wyoming-Colorado border near Savery, Wyoming.

The Savery preference right lease applications have potential for subsurface mining only. Most of the surface facilities for the underground mining operation would be located on private lands. Impacts resulting from facility placement and mine operations would be, for the most part, insignificant. Significant impacts would occur when mine employees, combined with an increase of total population (between 4,800 and 8,600 persons), would begin to settle in the Savery area. These impacts would be further aggravated when the mine closed and workers migrated from the area, leaving behind an oversupply of housing and community services.

Transportation systems, health facilities, and other services (police, fire protection, etc.) in the Savery area are adequate for the existing population of about 600 persons. However, extensive investment would be required to expand these services to accommodate 4,800 to 8,600 persons.

The Savery project could produce 4 to 7 million tons of coal per year. This level of production would directly compete with new and existing mines. In 1995, demand for new coal production for Carbon County would be about 5 million tons per year more than existing mines could provide. The Savery project could meet this demand, and thereby impede or delay new mine development near communities along I-80 until sometime around the year 2000, which would compound the recession in these communities.

The Savery project would employee between 1,000 and 1,800 persons and would cause an estimated population increase of 4,800 to 8,600 persons. Over time, nearly all of these people would settle in the Savery area. This new settlement would occur on crucial big game winter ranges, threatened and endangered wildlife-species habitat, and floodplains.

The Savery area contains some of the highest quality wildlife habitat in south-central Wyoming. This habitat is essential to the survival of numerous wildlife species, ranging from elk and deer to bald eagles and great blue herons. People moving into the area would build their homes and businesses within these habitats. In addition to this effect, increased human activity in the immediate vicinity could cause many animals to attempt to move to other habitats, which might not be available. This kind of human activity during a severe winter could cause a significant mortality rate for elk, deer, and perhaps bald eagles. These wildlife and economic impacts would be significant and could not be mitigated by the applicant.

Although BLM is obligated to process the preference right lease applications to determine if the applicant is entitled to a coal lease on the area, the No Development Alternative is the BLM's preferred alternative.

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INTRODUCTION

PURPOSE AND NEED

Gulf Oil Corporation has nine preference right coal lease applications (PRLAs) in the Savery, Wyoming, area (Table 2 and Map 3). As required by the regulations pertaining to management of federally owned coal (43 CFR 3430.3-1), the Department of the Interior must complete processing of all PRLAs by December 1, 1984. (PRLA processing is more fully described below.) This environmental impact statement (EIS) complies with the National Environmental Policy Act and is a part of the processing requirements for PRLAs.

EXTENT AND LOCATION OF THE SAVERY PROJECT

The Savery project is located in Wyoming and Colorado, about 13 miles east of Baggs, Wyoming, and 50 miles south of Rawlins, Wyoming (Maps 1 and 2). The project proposal would include Gulf Oil's nine application areas in a single subsurface (underground) coal mining operation, encompassing approximately 53,000 acres. Surface and mineral ownership in the project area is complex, since much of the federal coal is overlain by privately owned surface. The U.S. Forest Service administers approximately 2,412 acres of land in PRLAs W-0324035 and W-0324037. The BLM is authorized to lease all federal minerals, including Forest Service administered lands. However, the BLM must receive Forest Service consent before leasing coal. (Maps 3 and 4 and Table 1 delineate land and coal ownership.)

Even though the Savery project includes state and private lands, and the EIS includes analysis of the entire project, decisions regarding stipulations will be made for federal lands and federal coal only.

PROCESSING REQUIREMENTS FOR PREFERENCE RIGHT LEASE APPLICATIONS

PRLAs were authorized under the Mineral Leasing Act of 1920. Under this act the Secretary of the Interior issued prospecting permits in areas with no known coal deposits. These prospecting permits entitled the permittee to the exclusive right to prospect for coal, and then to noncompetitive, or preference right leases, if the permittee could demonstrate that the lands contained coal in commercial quantities.

The Federal Coal Leasing Amendments Act of 1976 abolished noncompetitive (preference right) leasing, subject to valid existing permits and applications, which included the Savery PRLAs. Under the new Federal Coal Management Program, the Bureau of Land Management (BLM) is now required to complete processing of all existing PRLAs by no later than December 1, 1984.

Processing of the PRLAs involves a series of steps to determine if the application will be rejected or if the applicant will be entitled to a coal lease. In the Savery PRLAs, the first two steps of this process have been completed: (1) submission, by the applicant, of an initial showing, which attempts to demonstrate the existence of commercial quantities of coal in the lease area; and (2) BLM's multiple-use planning, which includes consideration of the results of applying the coal unsuitability criteria (43 CFR 3461) and other multiple-use values to the lease area.

Steps yet to be completed on the Savery PRLAs are: (1) preparation of an EIS based on the applicant's initial showing and BLM's multiple-use planning; (2) development of any necessary stipulations and mitigation requirements, to be included in a lease proposal, for protection of environmentally sensitive areas or other values as identified in the EIS; (3) preparation and submission of a final showing by the applicant, which attempts to demonstrate that coal can be mined at a profit in an environmentally sound manner; and (4) determination by the BLM that the final showing adequately meets the stipulations and environmental protection requirements in the lease proposal, and, at the same time, determination by the Minerals Management Service (MMS) that the applicant can economically produce commercial quantities of coal. If the applicant is unsuccessful in meeting the final showing requirements, the application will be rejected. If the applicant is successful in meeting the final showing requirements, the applicant will be entitled to a coal lease.

This environmental impact statement, therefore, develops mitigation measures to be used as stipulations for the final showing. These stipulations will be combined with the applicant's mine plan for the Savery PRLAs to demonstrate that commerical quantities of coal exist, and that they can be mined at a profit in an environmentally sound manner. This information will then be used by the BLM and MMS to determine whether or not the applicant will be entitled to a lease on all or part of these PRLAs.

INTRODUCTION

TABLE 1

SURFACE AND COAL OWNERSHIP

	Surface Ownership (acres)	Coal Ownership (acres)
Private	26,812.80	2,832.97
State of Wyoming	15,241.01	14,678.58
State of Colorado	633.07	633.07
U.S. Government		35,258.49
Forest Service	2,412.35	
Bureau of Land Management	8,303.88	
Total	53,403.11	53,403.11

INTRODUCTION

TABLE 2

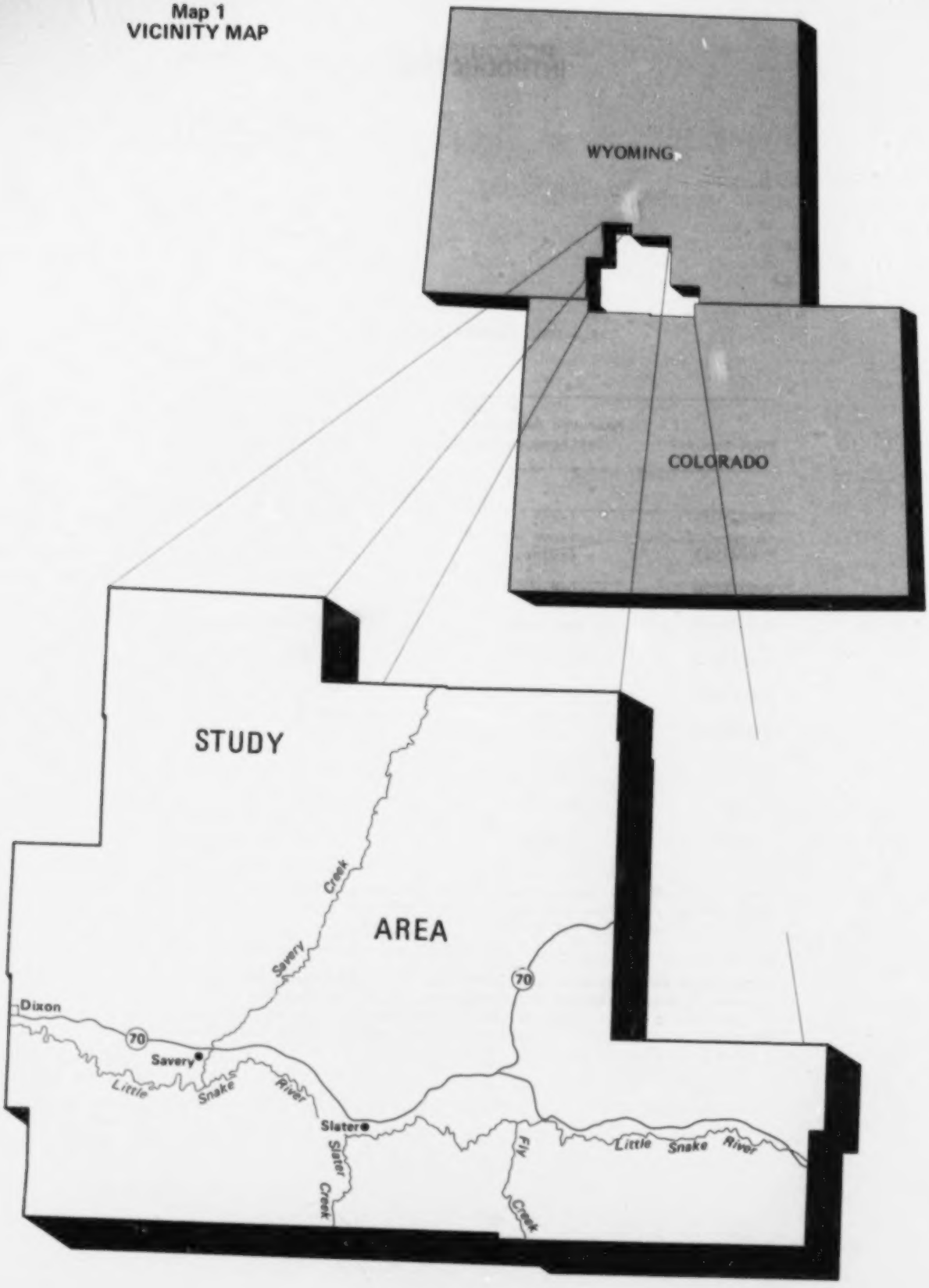
PRLA COAL RESERVE INFORMATION

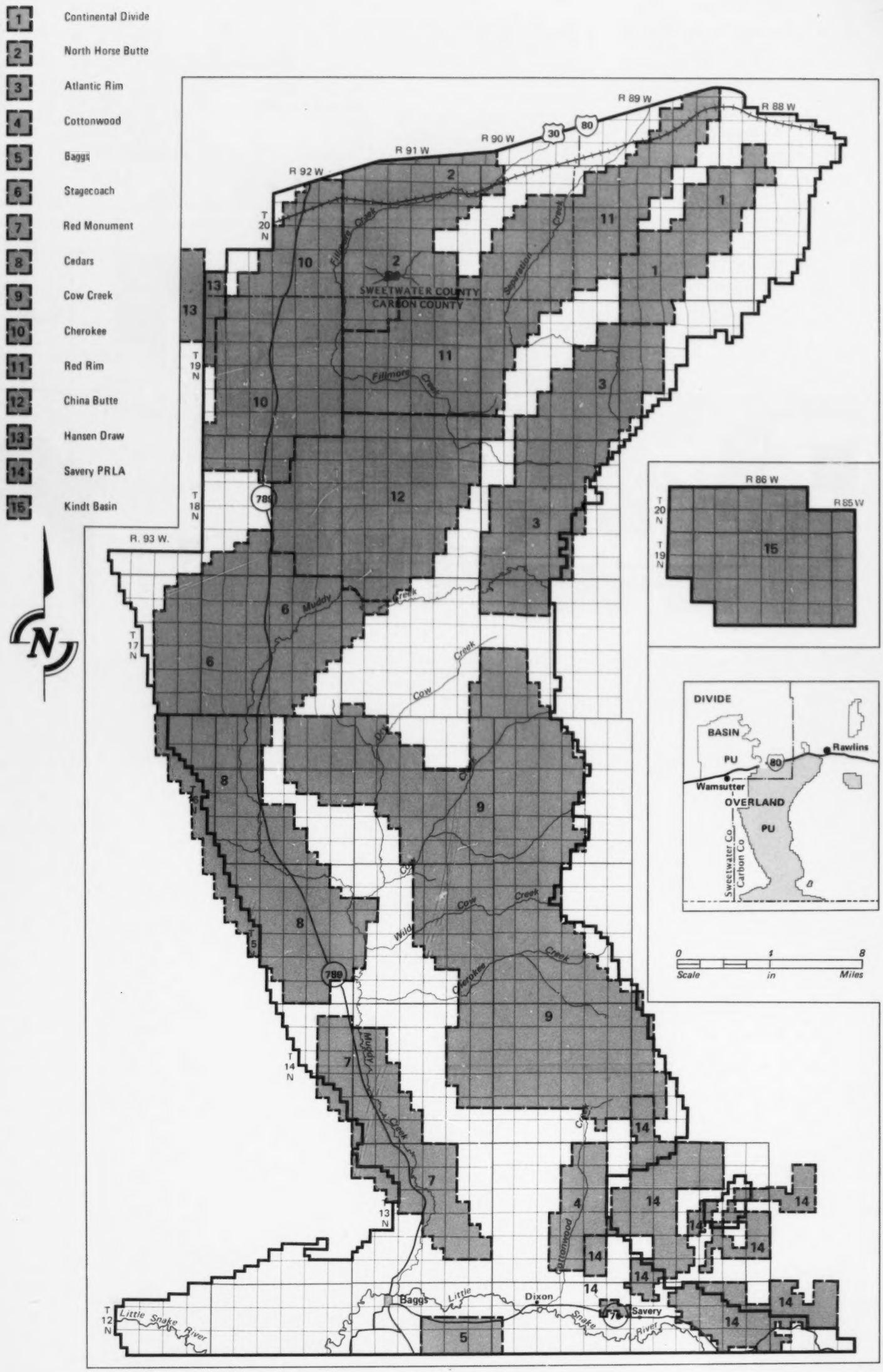
PRLA Numbers	Measured Reserves[1] (million tons)	Indicated Reserves[1] (million tons)
W-0324034	7.016	13.636
W-0324035	7.310	34.264
W-0374036	4.910	14.627
W-0324037	no reserves	no reserves
W-0324038	2.599	68.692
W-0324041	11.085	36.969
W-0324042	.413	.451
C-3605	1.810	4.753
C-3606	10.803	31.827
Total	57.934	205.21

Total demonstrated federal reserves = 263.144 million tons
BTU content (weighted average) = 10,502 BTU per pound
Sulfur content (weighted average) = 55 percent

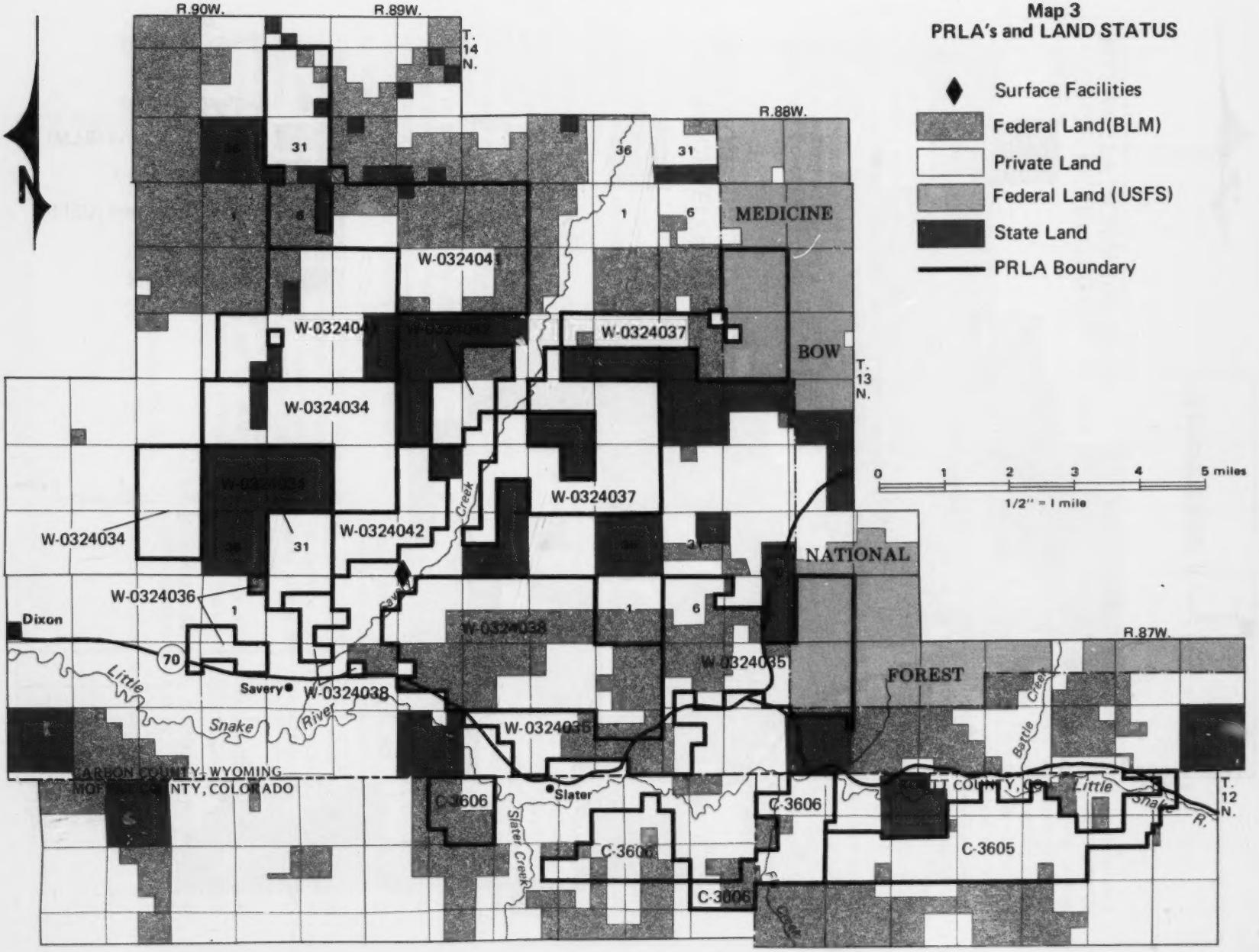
1/Measured and indicated are technical terms which describe the manner in which reserves are estimated. Measured reserves are closer to the drill holes or observation points than the indicated reserves. Definitions of these terms are found in USGS Bulletin 1450-B.

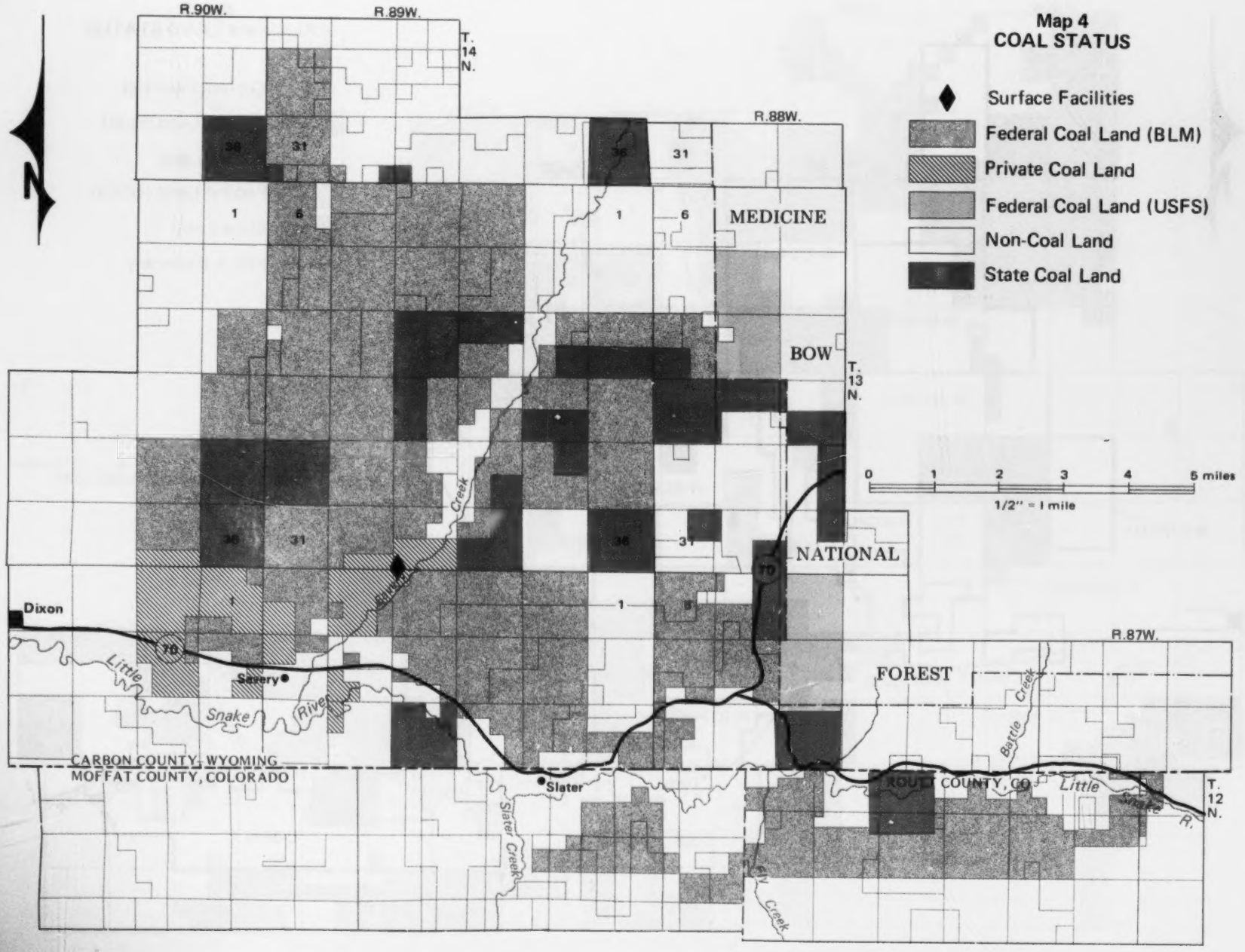
Map 1
VICINITY MAP





Map 2
POTENTIAL COAL DEVELOPMENT AREAS


Map 3
PRLA's and LAND STATUS
Surface Facilities
Federal Land(BLM)
Private Land
Federal Land (USFS)
State Land
PRLA Boundary
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
W-0324041
W-0324040
W-0324037
W-0324034
W-0324042
W-0324036
W-0324038
W-0324035
C-3606
C-3605
Dixon
Savery
Slater
Little Snake River
Savery Creek
Slater Creek
Battle Creek
70
0 1 2 3 4 5 miles
1/2" = 1 mile


Map 4
COAL STATUS
Surface Facilities
Federal Coal Land (BLM)
Private Coal Land
Federal Coal Land (USFS)
Non-Coal Land
State Coal Land
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
0 1 2 3 4 5 miles
1/2" = 1 mile
Dixon
Savery
Slater
Little Snake River
Barrie Creek
Slater Creek
Fly Creek
Little Snake R.
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO.
70

INTERRELATIONSHIPS WITH OTHER DEVELOPMENT IN THE AREA

The Savery project might conflict with one or several water development alternatives under consideration by the state of Wyoming in the Little Snake River Water Management project. The state of Wyoming has also indicated that this project might conflict with its Department of Environmental Quality's regulations regarding alluvial valley floors and wildlife habitat. According to state of Wyoming representatives, this conflict might lead to difficulties in permitting a coal mine in the Savery area (letter from Governor of Wyoming, April 14, 1982).

RELATIONSHIP WITH OTHER COAL DEVELOPMENT

The proposed PRLA project conflicts with BLM's land-use decisions affecting competitive coal in the Rawlins District.

Unlike PRLAs, competitive coal will be made available for leasing to many bidders in a free market or competitive system. Under the competitive coal leasing program, coal will be scrutinized for its quality, quantity, and potential multiple-use conflicts. Only high quality coal areas, in which mining is acceptable, will be mined. The leasing process itself attempts to create an atmosphere in which potential lessees bid against one another with the highest bidder receiving the right to lease the coal.

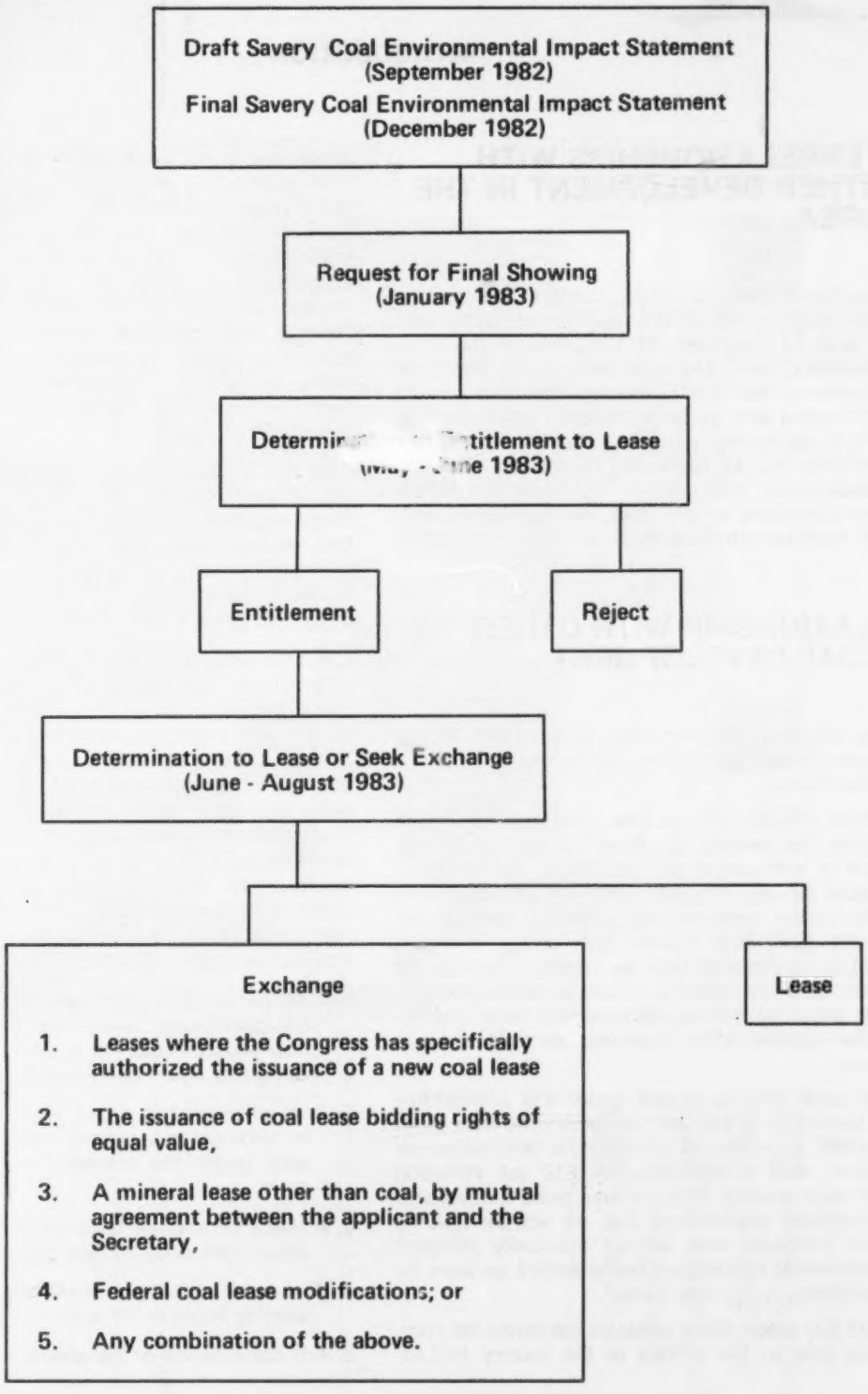
Any coal that is leased under the competitive coal leasing program will be considered in a land-use plan, a series of site-specific environmental analyses, and a regional coal EIS (all including public involvement). This process gives a developer a reasonable expectation that he will be able to mine a particular area without especially stringent environmental stipulations being added on after he has invested in the coal lease.

BLM has made some land-use decisions for competitive coal in the vicinity of the Savery PRLAs. These decisions would allow for the development of more coal of essentially equal quality north of the Savery area (Map 2). Although mining of this northern coal has potential for significant environmental impacts, it would be closer to existing transportation systems, which would translate into cheaper production costs and fewer environmental impacts, and it would be closer to existing communities that could accomodate and need increased economic growth. Conversely, the Little Snake River Valley cannot easily accomodate significant growth (BLM, 1982).

BLM's land-use decision states, if it were not for the Savery PRLAs, development could begin in these northern coal areas and proceed south over time to the Savery area. Simply stated, when considering all of the areas from which coal could be mined in Carbon County, it is not the right time to mine coal in the Savery area.

BLM's land-use decision also states, if it were determined that the applicant was entitled to a lease on one or more of the the Savery PRLAs, the BLM would attempt to negotiate with the applicant for an equitable exchange for his right to lease the coal for other commodities. (See Figure 1, which delineates processing requirements for PRLAs.) The applicant's entitlement to a lease would give him a legal right to a coal lease; therefore, there would be no assurances that an exchange would occur. With the applicant's concurrence, his entitlement to a coal lease could be exchanged, on an equal-value basis only, for:

1. A coal lease in another area where the Congress has specifically authorized the issuance of a new federal coal lease (i.e., a special act of Congress would be required);
2. Coal lease bidding rights, which would be applied in bidding for a federal coal lease in another area under the competitive coal leasing program;
3. A lease for another leasable federal mineral (i.e., other than coal, oil and gas) in another area;
4. A federal coal lease modification to expand an existing lease or mine; or,
5. Any combination of the above.


Draft Savery Coal Environmental Impact Statement
(September 1982)
Final Savery Coal Environmental Impact Statement
(December 1982)
Request for Final Showing
(January 1983)
Determi titlement to Lease
ne 1983)
Entitlement
Reject
Determination to Lease or Seek Exchange
(June - August 1983)
Exchange
1. Leases where the Congress has specifically authorized the issuance of a new coal lease
2. The issuance of coal lease bidding rights of equal value,
3. A mineral lease other than coal, by mutual agreement between the applicant and the Secretary,
4. Federal coal lease modifications; or
5. Any combination of the above.
Lease

PRLA FLOW CHART
Figure 1

CHAPTER 1

DEVELOPMENT ALTERNATIVE AND NO DEVELOPMENT ALTERNATIVE

INTRODUCTION

Because PRLA leasing decisions are totally dependent on the outcome of the processing requirements (i.e., the final showing), as previously described, the Secretary of the Interior does not have the option to consider rejection of a Preference Right Lease Application until the final showing has been evaluated and determined to be unsuccessful. The applicant's entitlement to a coal lease will be determined by his ability to demonstrate commercial quantities of coal on the PRLAs, under the terms and conditions of a proposed coal lease, which includes stipulations developed from this EIS to mitigate environmental impacts of mining. Therefore, one of the alternatives that must be analyzed is the mining and development of the PRLAs. The other alternative is a no mining and no development alternative, which evaluates the impacts that would occur if this area is not mined and not developed. Thus, the alternatives that can be addressed in this document are limited to only two—the Development Alternative and the No Development Alternative.

DEVELOPMENT ALTERNATIVE

The Savery PRLAs project has been proposed as a subsurface coal mining operation. There are three areas in which mining could occur: the south area, the northeast area, and the northwest area (Map 5). The three areas combined could produce as low as 4 million tons per year (MTY) or as much as 7 MTY for a 46-year mine life. These estimates of production are based on the applicant's initial showing. If development were allowed in these areas, the following events would be assumed:

1. The lease would be issued in 1985.
2. Construction and issuance of various permits would take seven years.
3. Construction in the northwest and northeast areas would begin immediately after construction had been completed in the south area.
4. The coal in the south area would be mined to the Little Snake River.
5. A series of tunnels would be constructed under the Little Snake River, which would allow coal to be mined from the two Colorado PRLAs. There would be no surface facilities, except for ventilation shafts, on the two Colorado PRLAs.
6. Mine permitting, construction, development, and reclamation operations would occur over a 60-year period. Surface disturbance would involve about 625 acres for the life of the project at 7 MTY or 300 acres at 4 MTY.

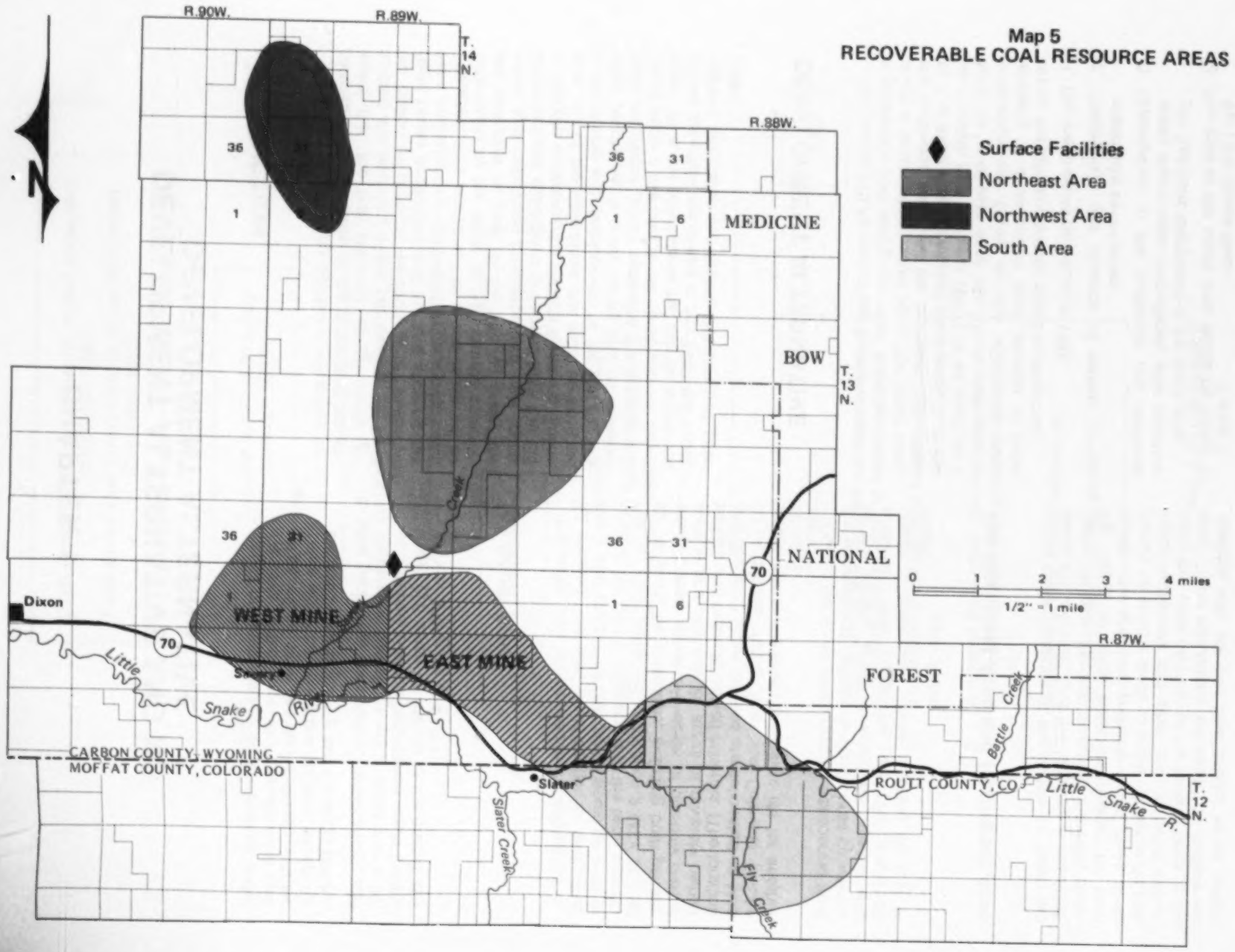
The South Area

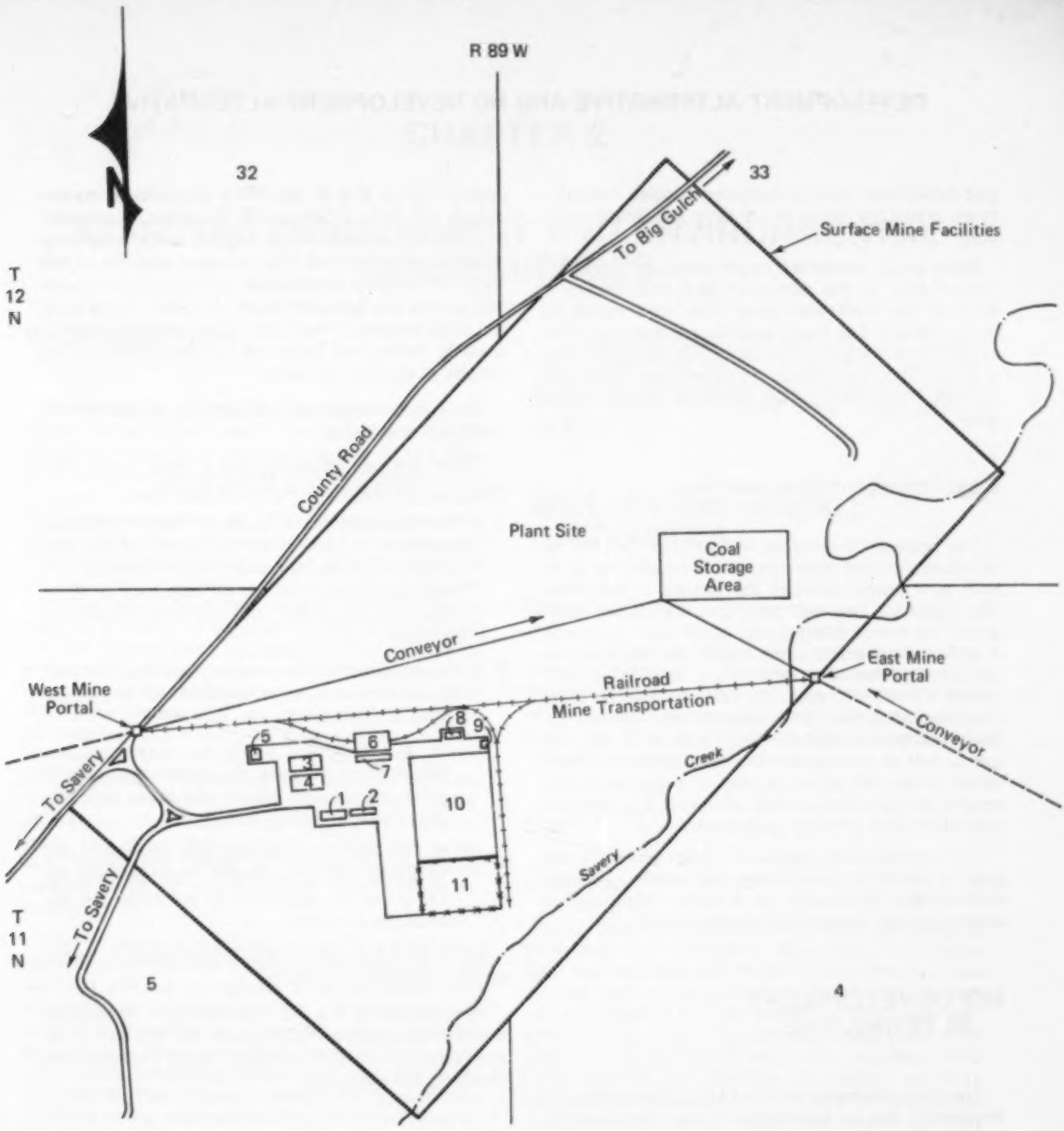
The south area is proposed in the applicant's initial showing. This area would contain an east portal and a west portal. The east portal would be used to develop the coal in Wyoming and the two Colorado PRLAs. Each portal would produce 2 MTY of coal for 36 years. Mine facilities, including both portals, would occupy about 275 acres of privately owned surface and coal and 25 acres of privately owned surface and federally owned minerals. (The location and design of these facilities are delineated on Map 6.) Additional mining from the Colorado PRLAs would extend the south area mine life for another 10 years.

Coal in the south area would be transported from the underground operations via covered conveyors to the surface where it would be crushed and screened. After processing, the coal would be stored in open piles, some reaching 50 feet in height.

The Northeast Area and Northwest Area

The exact locations of the portals for these two areas are unknown, and the following is assumed, based on coal resource data from the initial showing. About 50 acres would be needed for each portal. The applicant probably would place these portals on private lands to avoid encountering seasonal restrictions and other environmental stipulations that exist on most of the federal lands in the area. These stipulations are based on multiple-use conflicts with elk and deer crucial winter ranges


Map 5
RECOVERABLE COAL RESOURCE AREAS
Surface Facilities
Northeast Area
Northwest Area
South Area
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
WEST MINE
EAST MINE
Dixon
Slater
Slater Creek
Fly Creek
Battle Creek
Little Snake R.
Little Snake River
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO
70
0 1 2 3 4 miles
1/2" = 1 mile



LEGEND

1. Office
2. Office Parking
3. Change House
4. Change House Parking
5. Quality Control Office
6. Maintenance Shop and Warehouse Parking
7. Shop and Warehouse Parking
8. Boiler House
9. Welding Shop
10. Shop and Warehouse Storage
11. Mine Yard

500 0 500 1000
Scale in Feet

Map 6
SURFACE MINE FACILITIES

and threatened- and endangered-species habitat in these areas (for types of conflicts see Wildlife section).

Both areas combined could produce 3 MTY of coal: 1 MTY in the northeast area and another 2 MTY in the northwest area. The coal would be transported to the south area for processing, which would require another 225 acres for equipment and storage. This coal would be developed during the 46-year production period specified for the south area.

Coal Transportation and Use

The applicant's initial showing states that the alternatives for coal marketing are production of a rail spur or a power plant in the vicinity of the mine. The applicant has indicated that the power plant would not not an integral part of the mine proposal. A power plant would come under the Wyoming Industrial Development Information and Siting Act, (WS35-12-101 through 35-12-101; Laws 1975, Chapter 169; Laws 1977, Chapter 66). This act established the Industrial Siting Council. It also required that all developers who fall under the criteria listed in the act submit a plan or proposal to the council for alleviating social, economic and environmental impacts on local government.

The council must approve a plan before it will grant a permit for constructing the facilitiy. If federal authorization is requried for a power plant, further environmental analysis will be conducted.

NO DEVELOPMENT ALTERNATIVE

The only alternative to the Development Alternative, which can be addressed, is the possibility that the permit areas would not be mined (no development). This is due to the PRLA processing requirements and lack of Secretarial discretion to consider not issuing a lease for a PRLA that meets final showing requirements. The principal purpose of this EIS is to develop stipulations and mitigation requirements that the applicant must consider in preparing his final showing. Thus, any other possible alternatives to mining the areas will be dependent on the results of the final showing.

The No Development Alternative is the BLM's preferred alternative.

There are two situations which could occur that would cause the areas to not be mined:

1. If the applicant failed to show that commerical quantities of coal could be economically produced on the Savery area, the preference right lease application would be rejected, a lease would not be issued, and the areas would not be mined.

2. If the applicant's final showing were successful, but senstitive values were identified, two possibilities could result:

   a. An exchange could be negotiated for either other minerals of comparable value in other areas or for future coal lease sale bidding rights in other areas.

   b. The Secretary, lacking any other authority to protect the environment, could request the Congress for legislation to purchase the applicant's interests.

Either of these possibilities could result in partial or total exclusion of mining.

By addressing the No Development Alternative and the Development Alternative, the EIS will cover any resulting variation of impact levels between and including the extremes.

CHAPTER 2

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter contains the description of the Affected Environment and Environmental Consequences, including cumulative impacts. BLM's ability to mitigate impacts would be limited because the proposed mine would be a subsurface operation with surface facilities on private lands. The mine would, however, cause significant impacts, but these impacts would result from human population influxes and community growth over which the company would have little control and BLM would have no authority to stipulate through a coal lease. Control of community expansion is the purview of state and local government not the federal government. All of the anticipated, significant impacts of mining the federal coal are discussed in this chapter. Geology and minerals, socioeconomics, hydrology, wildlife, and tansportation would all be significantly impacted. Resources not discussed were not considered to be significantly impacted: air quality, recreation, threatened and endangered plants, visual resources, fish, wetlands, wilderness areas, soils, vegetation, areas of critical environmental concern, wild or scenic rivers, and cultural resources.

Prior to taking any federal action on a mine plan, the Office of Surface Mining, in consultation with the BLM and the appropriate State Historic Preservation Officer, will identify areas within a proposed mine plan and adjacent areas that have a potential for receiving direct or indirect impacts on historic and cultural properties (determined pursuant to 36 CFR 800.3). The Office of Surface Mining, with concurrence of the appropriate State Historic Preservation Officer, will ensure that intensive field inventories have been, or will be, completed on the mine plan and adjacent areas before it recommends approval of a mine plan. A report of the cultural resource inventory will be submitted to the BLM and the U.S. Geological Survey. In the event of a failure to reach an agreement with the appropriate State Historic Preservation Officer regarding the appropriate inventory, the Office of Surface Mining will request council review in accordance with 36 CFR 800.6 (Memorandum of Agreement).

During the public comment period, the BLM will consult with the Soil Conservation Service for a final determination of prime or unique farmlands that could be affected.

The analysis (Savery PRLA Site-Specific Environmental Report) conducted for resources not significantly impacted is available for public review at the Rawlins District office or the Craig District office of the BLM.

GEOLOGY AND MINERAL RESOURCES

Introduction

Coal resources, oil and gas, and geological hazards are pertinent to the environmental analysis of the Savery project. There are no other known valuable mineral resources in the immediate area. However, this area has been identified as potentially valuable for uranium production.

Coal

Introduction

Coal data was based on the initial showing by Kemmerer Coal Company (now Gulf Oil Corporation) that was filed with BLM in 1979. The data was derived from 47 exploratory holes drilled under federal prospecting permits issued in 1966 and 1967 and extended in 1972 for two additional years. This data was supplemented with other available data. Other mineral and geologic information are from the geologic literature and the BLM resource data base maintained in the Divide Resource Area office (Rawlins, Wyoming) and the Little Snake Resource Area office (Craig, Colorado).

Affected Environment

In the Savery project area, coal beds range from 1 to 22 feet thick, and there are as many as 15 beds at least 4 feet thick and 6 beds at least 5 feet thick. These beds occur in the Mesaverde group of formations, particularly the Williams Fork Formation in Colorado and the Almond Formation in Wyoming. (Specific coal reserve information for the PRLAs, as supplied by the applicant, is presented in Table 2.) Within the PRLAs, however, there are areas where coal reserves have not been demonstrated. No specific data is available on coal reserves for private and state lands.

Coal in the area is bituminous to subbituminous (Ball and Stebinger, 1910; Hatch and Barclay, 1979). Average as-received analysis of the coal shows that it is 6.61 percent ash, 0.58 percent sulfur, and has a heating value of 10,359 Btu's (Ball and Stebinger, 1910). Lucksinger Mine, a small coal mine limited to local use, is located in SE¼NE¼, Section 18, T. 12 N., R. 88 W.

Environmental Consequences

Development Alternative. Under this alternative, a portion of the coal reserves would be mined and used to produce energy at some other location. The coal reserve base at the south area would be reduced by an estimated 184 million tons (based on a sustained annual production of 4 MTY for 46 years). The coal reserves in the northeast and northwest areas would be reduced by an estimated 108 million tons (3 MTY for 36 years). Based on the Development Alternative, the mining method proposed in this area probably would recover about 50 percent of the in-place coal reserves for a maximum recovery of approximately 292 million tons of coal. This recovery rate is typical of room and pillar type underground mining.

Additional potential impacts associated with development of an underground mine are subsidence, coal fires, and mine accidents. The degree of subsidence is dependent on the mine depth, integrity of the overlying rock, and amount of support left in the mined-out areas. Subsidence would be an important factor in mine design and could be more accurately predicted, and if necessary, mitigated when a mine plan is later developed and submitted for approval by the states of Wyoming and Colorado.

During the life of the mines, coal fires could occur where the surface area of unrecovered coal was exposed to air movement. Also, if natural gas pockets occurred in the coal, mining activities could cause them to be vented into the mine area, creating a potential for explosion or fire.

No Development Alternative. Under this alternative, the federal coal reserves would not be mined. If the PRLA applicant demonstrated commercial quantities, and this alternative was implemented through an exchange or other compensation to the applicant, the federal coal reserves (currently estimated to be about 260 million tons) would be available for consideration for future competitive federal coal leasing, if the situation warranted. Where economically feasible, state or private coal reserves could still be developed.

Short-Term Use Versus Long-Term Productivity

The short-term use of the coal resource, under the Development Alternative, is to produce energy. In the long-term productivity, under the No Development Alternative, the coal would remain available for later development if improved coal recovery techniques and/or different market situations occurred.

Irreversible and Irretrievable Commitments of Resources

Coal that would be mined and consumed would be irreversibly and irretrievably committed.

Conclusions

The Development Alternative would deplete the coal resource in the project area by up to 292 million tons, based on the maximum mining assumptions. Subsidence is a potential impact with a gradual and long-term effect, which cannot be predicted until mining plans are developed. The No Development Alternative would leave the coal reserves in place, but available for future use.

Oil and Gas

Introduction

Coal development could conflict with oil and gas development. This discussion does not indicate that there would be significant conflicts with oil and gas development, but special consideration should be given in the final showing to avoid conflicts.

Affected Environment

Oil and gas leases have been issued throughout the Savery project area. Most of the current production is gas. The principal producing formations are in the Mesaverde group. The Savery oil and gas field, a known geologic structure that was discovered in 1971, is located in Sections 9 through 17 and 21 through 24, T. 13 N., R. 89 W. The Dome gas field, located primarily in Section 13, T. 12 N., R. 89 W., contains located gas at a depth of between 2,492 to 2,540 feet and 3,110 to 3,140 feet. The well is currently shut-in because of a lack of marketing facilities. The Focus oil field, located 2 miles east of the southern part of the Savery project, occupies various sections of T. 12 N., R. 87 W.

Environmental Consequences

Development Alternative. Under the Development Alternative, the potential exists that oil and gas development could conflict with coal development. Where wells have been developed or are proposed to be developed in structures below the coal, mutual agreement between the coal and oil and gas developers would have to be reached, based on rights established by each party.

No Development Alternative. Under the No Development Alternative, no conficts are foreseen.

Conclusions

The potential exists for coal development to conflict with oil and gas activities. However, no specific conflicts have surfaced. If conflicts surfaced, they would have to be resolved at that time.

Geological Hazards

The magnitude of current geological hazards is unknown, but some normal faulting and slumping are known to exist within the geological structures near or within the Savery project area. No specific concerns have been raised to date.

SOCIOECONOMICS

Introduction

Energy development could create significant socioeconomic impacts to communities in the proximity of the development site as well as to larger, service-oriented communities located some distance from the area. Impacts could result from an influx of people attracted to the area by employment opportunities, which would cause a proportionate increase in the demand for community services, housing, medical care, etc. In areas unprepared for a rapid pace of economic growth, these impacts could bring about hardships to the social and economic structure of communities.

This section is designed to outline the social and economic characteristics of the affected communities and the consequences brought about by each alternative. Those components of the local and national economy, which are slightly affected or not affected at all, are excluded from this discussion in order to more clearly outline the relevant issues.

Social and Economic Characteristics

Introduction

The Development Alternative would directly affect the social and economic structure of communities in the Little Snake River Valley located west of the Medicine Bow National Forest. These communities include the towns of Savery, Dixon, and Baggs, Wyoming, and Slater, Colorado. To some extent, the communities of Rawlins and Wamsutter, Wyoming, and Craig, Colorado, would be affected also. Rawlins and Craig are relatively large population centers and function as trade centers for the smaller towns in the area. The following discussion describes the social structure and economy of the affected communities and is followed by an analysis of the impacts associated with mine development.

Affected Environment

Savery (population 25) is a small, unincorporated town located on the western edge of the Medicine Bow National Forest in the Little Snake River Valley. The predominant lifestyle is that of a small ranching community. No other services are available.

Dixon (population 82) is located 6 miles west of Savery and, although primarily an agrarian economy, is noticeably larger than Savery and is incorporated. A variety of services are available in Dixon; however, many people travel to Baggs, Wyoming, or Craig, Colorado, to shop. No other services are available.

Baggs (population 430) is the dominant community in the valley. A multigrade school (grades 1 through 12) is located there as well as various other services characteristic of a town this size. Lifestyles and attitudes vary with occupational status. Health services are offered through a satellite clinic operated in Baggs, which is staffed by three medical technicians. Major health needs are met in either Rawlins, Wyoming, or Craig, Colorado.

Slater, Colorado, (population 15) is a small, unincorporated town located approximately 10 miles southeast of Savery. Today, the town consists of a small trailer park, a post office, and an RV park. The town serves passing tourists as well as the surrounding ranching area; however, most services are sought in Dixon or Baggs.

In general, housing is relatively scarce throughout the Little Snake River Valley. Employment associated with oil and gas activity west of Baggs has eliminated much of the available housing in Baggs and Dixon, and Savery does not have any available residential units.

There is an estimated 21,000 acres of private land that has potential for residential and commercial development in the Little Snake River Valley area from Baggs to Slater. (These areas are shown on Map 7.)

Zoning regulations in Colorado could severely limit the amount of residential development south of Savery and in the vicinity of Slater. Regulations in Moffat County, Colorado, restrict single family homes to 35 acres or more. Homes in a platted subdivision must be on a plot of at least 5 acres, unless that subdivision has a public water and sewage system.

Wyoming zoning laws require only 1 acre per home. This would indicate that the majority of residential development would occur along the Little Snake River Valley north of the state line, since less acreage would be necessary to establish a home site.

In a recent study done by the Rawlins District BLM (Divide Resource Area Unit Resource Analysis, 1981), the Little Snake River Valley communities of Baggs, Dixon, and Savery were identified as areas incapable of absorbing significant population growth. In many instances, sewage and water systems, law enforcement, fire protection, and other community services are already at or beyond capacity. The towns of Savery and Slater are unincorporated and have no formal community structure or services. Any economic growth would require new housing and updating or construction of service facilities.

These communities do not have large outside revenue sources regularly available to them; however, several communities have obtained federal and state grants for capital expenditures in recent years. Recent bond issues have obligated most of the available bonding capacity of these communities; therefore, outside assistance would be required for any major expansions. Availability of federal and state grant and loan funds would be essential to the further expansion of community facilities in the event of a future rapid growth in population.

Rawlins, located in south-central Wyoming, is a city of approximately 11,485 persons (1980) and is the largest city in Carbon County. It is the county seat and functions as the regional trade center for many retail services. Rawlins' economy is supported by resource development activities such as ranching, uranium, coal mining, and oil and gas exploration and production. Other basic economic activities in Rawlins include the operation of the state penitentiary, tourist facilities and retail businesses. Rawlins also functions as a crew change-point for the Union Pacific Railroad.

Health facilities are adequate, offering services ranging from counseling and mental health to surgical specialties. A 90-bed nursing home is also available.

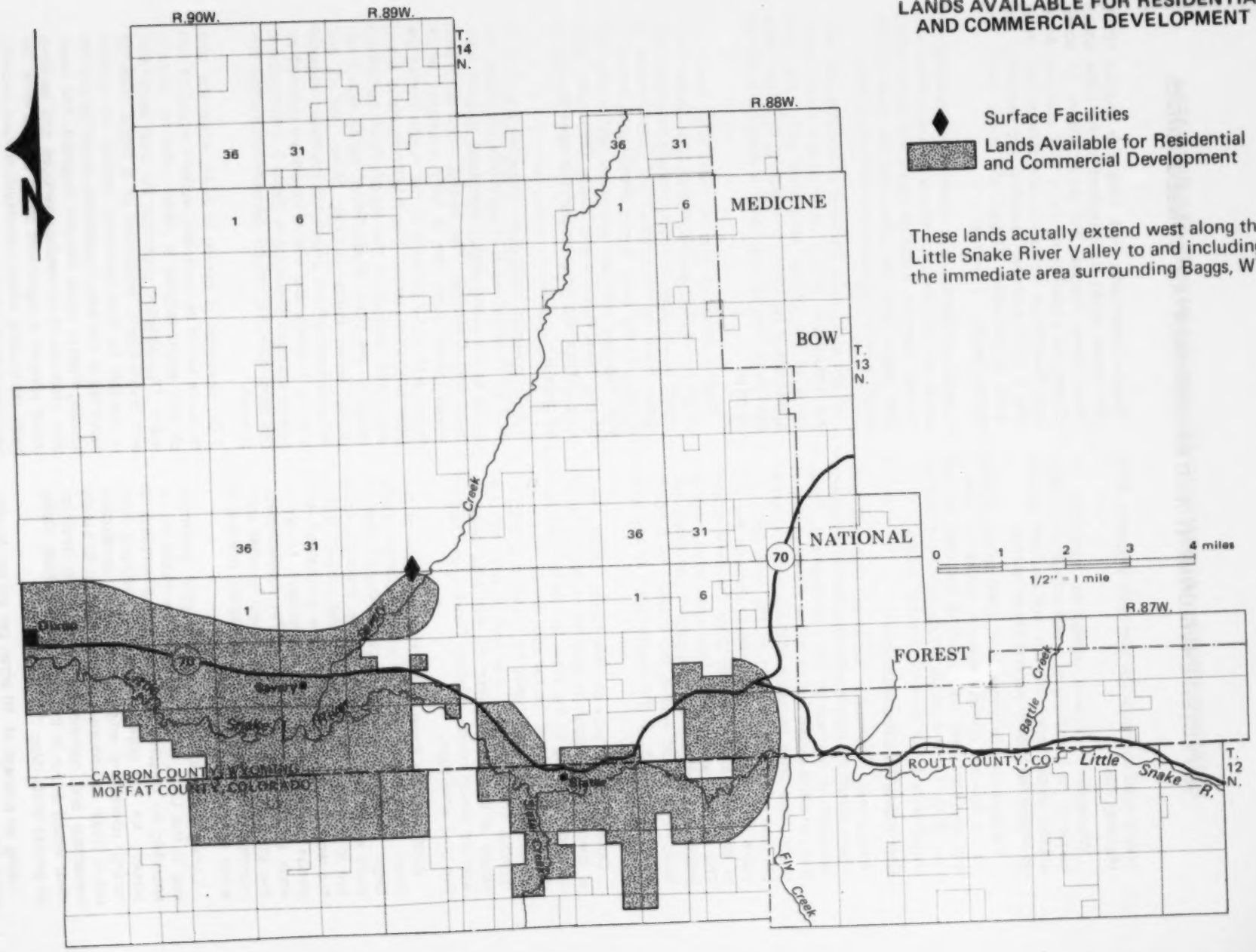
The city's educational system is adequate, providing a high school, middle school, and several elementary schools, each of which could accomodate a growing community. Recreational facilities are available, and the city's sewage, waste disposal, water systems, and police and fire protection are adequate for a total population of approximately 15,000.

Craig, Colorado (population 8,134) has already gone through significant energy-boom growth and social change. In the last two to three years, the town has largely caught up with the effects from its 1970s boom. Shopping facilities are complete; formal mental health, social welfare, medical, law enforcement, and other human services systems are in place and functioning, though there is still some problem in providing a full range of medical services. With completion of the two new school buildings in the fall of 1981, school capacities are sufficient for considerable growth (up to about 1,000 new students). Recreational facilities are improving as efforts are made to provide more variety and space. However, this remains an area of concern, particularly for youth and young, single workers. Craig seems to be in a state of fairly good social equilibrium at the present time and should be able to absorb new growth as it occurs, if it does not occur too rapidly.

Housing is currently available in Craig, both as sale and rental units. In addition, numerous mobile home lots have been developed, offering space for a more transient population.

The town of Wamsutter, Wyoming (population 682) is identified as a potential settlement area for families associated with the Savery project. Although Wamsutter is located some distance from the mine site, it is possible that workers would move their families there for available housing. A

Map 7
LANDS AVAILABLE FOR RESIDENTIAL AND COMMERCIAL DEVELOPMENT



county road connects the town with Wyoming State Highway 789.

Wamsutter's housing availability fluctuates because of the transitivity of a percentage of the population. Mobile home lots are now available as well as residential lots for several dozen homes.

For purposes of comparison, 1980 census figures for the affected communities are shown in Table 3 and supplemented with baseline forecasts to the year 2028. Table 4 shows employment and income statistics by sector for each affected county.

Environmental Consequences

Development Alternative. Social and economic conditions would be significantly affected by population increases as a result of mine employment. These direct impacts would first be felt in the short term (1 to 20 years after issuance of the lease) and would become most pronounced in the long term (20 years after issuance of the lease through the end of mine life) and especially after the mine closes. The impacts would occur from population influxes, settlement, and resettlement patterns and mine closure, which would lead to the creation of a boom-and-bust situation in the communities of the Little Snake River Valley.

During the first year of mine facility construction, a railroad spur would be built from either Creston Junction or Craig to the mine for transportation of coal. Construction of the rail spur would require approximately 300 employees for a period of 9 to 11 months. This temporary employment does not constitute a significant impact to the area because workers would reside in either Rawlins or Craig or live on a work train.

Approximately three years after issuance of the lease, construction of the mine facilities would begin. Impacts from construction related employment would be temporary in nature. Workers would live in temporary housing near the project during the work week and commute to a permanent residence, some distance from the project, on weekends (Murdock and Leistritz, 1979). Nevertheless, this situation would create an impact to small communities where services and temporary housing or trailer space would be limited.

During the period of mine construction, communities in the Little Snake River Valley would be responding to existing demands and attempting to prepare for the population growth resulting from mining operations employment. Land developers would begin to acquire land and attempt to satisfy residential and commercial needs. This development would occur in the Little Snake River Valley on private lands (Map 7).

Using an average of .10 acres per person to estimate adequate standard of living requirements (Green River-Hams Fork Final EIS, August 1980), 385 acres would be disturbed in the Little Snake River Valley (Baggs, 252 acres; Dixon, 71 acres; Savery, 62 acres) under the 4 MTY scenario. Acreage disturbance would increase substantially under the 7 MTY scenario, requiring approximately 700 acres in the valley (Baggs, 454 acres; Dixon 129 acres; Savery, 111 acres).

Most residential and commercial development would occur in the proximity of an established community. However, evidence exists that some individuals prefer rural life-styles and will build or purchase a home outside of a community's limits.

In the short term, because of housing and service constraints in the Little Snake River Valley, many of the people associated with mine operations would be forced to reside in the major trade centers of Rawlins and Craig, a distance of 93 and 62 miles.

Over a period of 5 to 10 years after mine construction, housing supply in the Little Snake River Valley would grow to accommodate increased population from mining employment. The demand for housing in the Little Snake River Valley would be high, spurred by the excessive commuting distances from Rawlins and Craig. Community services, utilities, etc. would expand to meet the expected growth.

Both potential production scenarios (i.e., 4 MTY or 7 MTY) would result in significant population impacts to the communities discussed, in both Wyoming and Colorado. The lowest level of impact would occur under the 4 MTY scenario, which would add 4,760 persons to the region during the peak production years. The 7 MTY scenario would add 8,568 persons to the region. Peak population levels in the Little Snake River Valley would approach levels similar to Craig. Direct, indirect, and induced employment, population increases, regional income, housing, and school needs are detailed for both production scenarios in Table 5. Information in this table does not include railroad construction employees.

On cessation of mining in 2045, when the coal resource would be depleted, workers would be laid off and would migrate to other areas for employment. This situation promotes the bust associated with boom towns dependent on a single resource or industry for their economic viability. As workers move out of the area, businesses would fail and the housing market would become stagnant. The resultant underuse of community services and facilities would present a significant strain on the local tax base, particularly where communities have recently committed themselves to new school construction, increased public services, etc.

TABLE 3

BASELINE POPULATION STATISTICS AND FORECASTS

	1980[1]	1987	1992	1999	2028
Carbon County	21,823	30,152	35,632	43,352	75,332
Rawlins	11,485	15,869	18,753	22,816	39,647
Baggs	430	594	702	854	1,484
Dixon	82	115	135	165	286
Savery	25	33	39	48	83
Sweetwater County	41,662	50,755	57,283	66,393	104,133
Wamsutter	682	812	916	1,062	1,666
Moffat County	13,129	17,476	20,877	25,663	45,448
Craig	8,134	10,818	12,923	15,885	28,132
Slater	15[2]	18[2]	20[2]	22[2]	24[2]

[1] U.S. Department of Commerce, Bureau of the Census.

[2] BLM, Rawlins District office estimate.

Note: 1985 through 2028 forecasts are from Wyoming Department of Administration and Fiscal Control and BLM Rawlins District estimates.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

TABLE 4

EMPLOYMENT AND INCOME STATISTICS

	Employment	Personal Income (thousand)
Carbon County[1]		
Mining	3,091	94,192
Construction	901	18,462
Trade	1,629	19,214
Services	1,341	12,931
Other	4,176	66,603
Sweetwater County[1]		
Mining	6,294	160,102
Construction	2,729	65,207
Trade	3,859	41,079
Services	2,359	35,698
Other	5,320	83,417
Moffat County[2]		
Mining	720	25,098
Construction	500	13,229
Trade	1,360	17,456
Services	560	7,853
Other	2,010	32,411

[1]Wyoming Income and Employment Report, third edition, Department of Administration and Fiscal Control, Cheyenne, Wyoming. May 1981.

[2]BLM, Craig District office, Craig, Colorado. January 1982

TABLE 5

SOCIOECONOMIC IMPACTS[1]

	1987	1992	1999	2028
Four Million Tons per Year Production				
Direct employment	200	700	1,000	500
Total employment[2]	290	1,190	1,800	900
Population	613	2,993	4,760	2,380
Personal annual income (regional)[3]	$ 8,000,000	$35,000,000	$54,000,000	$27,000,000
Housing needs (units)	245	949	1,408	704
School enrollments	232	1,352	2,240	1,120
Settlement patterns[4]				
Rawlins	208	400	190 (.8)[5]	---
Baggs	49	1,167	2,523 (295)[5]	1,547
Dixon	18	389	714 (438)[5]	452
Savery	12	329	619 (1,263)[5]	381
Wamsutter	12	30	---	---
Craig	306	628	714 (4.5)[5]	---
Seven Million Tons per Year Production				
Direct employment	200	1,000	1,800	1,000
Total employment[2]	290	1,730	3,240	1,800
Population	613	4,421	8,568	4,760
Personal annual income (regional)[3]	$8,000,000	$51,000,000	$97,000,000	$54,000,000
Housing needs (units)	245	1,371	2,534	1,408
School enrollments	232	2,024	4,032	2,240
Settlement patterns[4]				
Rawlins	208	619	343 (1.5)[5]	---
Baggs	49	1,742	4,541 (532)[5]	3,094
Dixon	18	580	1,285 (788)[5]	904
Savery	12	500	1,114 (2,273)[5]	762
Wamsutter	12	44	---	---
Craig	306	937	1,285 (8)[5]	---

[1] All figures represent increases as a result of mining coal on the Savery PRLAs, over baseline conditions for the years displayed.

[2] Includes all employment (direct, indirect, and induced) as a result of mining coal on the Savery PRLAs.

[3] Income is shown in 1981 dollars.

[4] Migration to communities in the Little Snake River Valley was calculated assuming a 9 percent growth in housing supply over a 10-year period.

[5] Numbers in parentheses represent the percentage change in population during peak production years.

Mining induced population increases in the Little Snake River Valley would also have an economic impact on recreation and wildlife revenues. Although exact figures are unavailable at this time, recreation user-days would increase at nearby sites. Conversely, wildlife numbers would be reduced in the immediate area as a result of human activity. Ultimately, this would affect community and state revenues from hunting and fishing activities.

No Development Alternative. This alternative presents two distinct options: (1) lease rejection from an unsuccessful final showing, and (2) exchange or other compensation for the lease rights. Each option will be discussed separately.

1. Unsuccessful Final Showing. Under this circumstance, the lease applicant has shown uneconomical coal reserves in the PRLAs. Exploration has shown that the coal is not of high enough quality or quantity to feasibly extract under present mining technology. In terms of the nation's economic well-being, this situation represents a loss to society, both as a potential employment source and as a contributor to Gross National Product, severence taxes, etc.

   The Little Snake River Valley area would continue its existence much as it has in the past. In the advent of new coal mining technology, the coal could again be evaluated for its mining feasibility, and at that time, be reanalyzed for its impacts to the environment.

2. Exchange. Several methods are identified in Chapter 1 as being potential exchange or compensation choices. Although each is different in concept, all achieve identical ends, that is, potentially serious adverse impacts are avoided while providing for an equal exchange or compensation for resource value.

The exchange or compensation proposal could generate several beneficial elements:

1. Conservation of an Asset. The coal in the PRLAs would remain available for future consideration in BLM's competitive coal leasing program and would appreciate in value as a nonrenewable resource. If the coal is conserved, it would be available to society when the demand for coal necessitates its extraction.

2. Employment. Although employment would be directed away from the PRLAs, it would not be lost. The labor force required by the company does not exist in the Little Snake River Valley. By exchanging for bidding rights of equal value elsewhere in the state or nation, the labor force would merely be employed in the area where the development would occur. Thus, resolving the rapid growth impact that would occur in an area incapable of coping with it.

3. Consistency with Rawlins District 1982 Land-Use Decisions. This alternative closely follows BLM's planning decision for the 1982 coal leasing in the Rawlins District. The decision calls for a north-to-south sequencing of coal leasing and development in the Divide Resource Area. Sequential development would best accommodate the economic growth potential of Carbon County, because it places the majority of population increases in areas that are currently capable of absorbing growth (e.g., Rawlins) and allows those communities farther south to expand their services and housing on a more gradual basis (e.g., Baggs, Dixon, and Savery). By sequencing the development, growth would occur in a more orderly fashion and prolong the economic viability of the area, thereby substantially reducing the potential for creating boom and bust cycles.

Coal Markets

Introduction

Any coal leased and developed in south-central Wyoming and northwestern Colorado would directly impact potential coal development elsewhere in the region. The magnitude of the impact would be influenced by the demand for coal and industry's ability to meet that demand. Coal developed in the Savery project would compete with existing mines and future federal coal leases. Demand for coal is not expected to significantly increase until sometime after the year 2000 (Rocky Mountain Energy, July 1982). If the Savery PRLAs were developed, no additional new mines would be expected to open in Carbon County until after 2000.

Affected Environment

In 1980, various sectors of the U.S. economy consumed 824 million tons of coal. Southern Wyoming coal supplied over 3 percent of that market. Coal industry forecasts estimate that coal demand will grow at a rate of better than 5 percent annually through 1995.

In recent years, southern Wyoming coal has become increasingly important to the U.S. economy. The Clean Air Act of 1970 (and subsequent amendments) placed Wyoming coal high in industrial demand because of its low sulphur content. Although this act may be amended to relax air quality standards, this will not impact demand for Wyoming coal, since the coal industry anticipates a favorable outlook for southern Wyoming coal in foreign markets. This market should remain viable into the foreseeable future.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Carbon County's economy is heavily dependent on the coal market. In 1980, over 34 percent of the county's labor force was employed by mining, of which coal is a significant part. This reflects the magnitude of revenues and jobs that are associated with the coal industry.

Environmental Consequences

Development Alternative. When a commodity is supplied to a market, it is supplied because a certain price is received that is high enough to offset production costs. If the market is in equilibrium (that is, supply equals demand), additional quantities of that commodity would be uneconomical because of a decrease in price brought about by an oversupply.

Since PRLAs are outside of the competitive aspect of BLM's coal program, this alternative could reduce competition in the marketplace. If this alternative were accepted, there would be a distinct possibility that the competitive leasing tracts, which were determined acceptable for development for the 1984 coal lease sale, would remain undeveloped because of the amount of coal production from the PRLAs.

Total mine capacity in Carbon County has been forecast to be around 15 MTY by 1995. (Capacity is based on communications with coal company representatives in Carbon County.) Domestic coal demand is expected to be about 20 MTY, resulting in coal demand exceeding coal supply by about 5 MTY. The Savery PRLAs could produce between 4 and 7 MTY. If the Savery PRLAs were leased, no new coal development would be expected to occur until sometime after 1995. (The preceeding situation is based on the assumption of a constant rate of growth in demand for coal.)

The lack of further coal development near Rawlins and Hanna would aggravate the recession in both communities, at least until 1995. If another five to seven years were added to include new-mine construction and permitting time, one could expect the recession in both Rawlins and Hanna to extend beyond the year 2000.

No Development Alternative. Under this alternative, coal development would continue under a competitive or free market system. Companies interested in mining the tracts determined acceptable for the 1984 coal lease sale would be in competition with one another, promoting efficiency in the marketplace and higher revenues for federal and state treasuries. Typically, the company that can offer the highest bid for a tract most often displays the most cost effective method of extraction. Thus, coal is offered to society at a price that reflects an optimum allocation of resources.

Unavoidable Adverse Impacts

The impacts described in this document constitute unavoidable, adverse impacts; therefore, they will not be discussed further. Other impacts (irreversible, irretrievable, and short- and long-term) are outlined below.

1. Population loss to Rawlins as a result of worker migration to the Little Snake River Valley would be a short-term impact (10 to 15 years after mine opening).
2. The additional housing and community infrastructure necessary to serve the population and industrial growth in the Little Snake River Valley would be an irreversible commitment of resources.
3. Land use for urban expansion and mine-related uses would be irretrievable.
4. The small-town sense of community in the Little Snake River Valley would be lost. Even with population decline after mining, there would be no return to the prior social structure.
5. After mining, a long-term adverse impact would become evident through the loss of a viable economic base that provided substantial employment and income.

Conclusions

The Federal Coal Program plays a very important role in the economy of south-central Wyoming. Altering this role would create significant social and economic hardships to those communities that would be affected both by PRLA development and by reducing the competitiveness of the coal program.

The alternative that best serves the needs of society with the least amount of adverse impact is the No Development Alternative. Within this alternative, the exchange or other compensation proposal is most optimal when consideration is given to several issues.

1. The coal in the PRLAs continues to be an asset to the nation's resource stock.
2. The socioeconomic impacts are avoided in an area unable to cope with rapid population growth.
3. Competition among bidders is reintroduced into the marketplace.
4. The potential coal lease tracts for the 1984 coal lease sale are the more desirable areas to develop.

WILDLIFE

Direct impacts to wildlife habitat and animal populations resulting from the surface facilities at the mine in the south area would be minimal. Approximately 25 acres of cottonwood-riparian and sagebrush mixed grassland habitat, which is under private surface-federal mineral ownership, would be altered throughout the life of the mine. The placement of other mine facilities such as ventilation shafts, additional surface facilities to handle coal production and transportation on the northeast and northwest areas, or marketing the coal to a coal-fired steam generation plant are not currently predictable events. Impacts to the area would vary according to the placement and frequency of these facilities.

Human population increases in the Little Snake River Valley would play a significant role in adversely affecting wildlife populations. Between 1,400 and 2,500 residential units (Table 5) and an indeterminate increase in commercial facilities, fences, vehicular traffic (from 340 average trips to 3,000), loose dogs, and recreational activities such as snowmobile use would all play a role in adversely affecting wildlife populations. The significance of these impacts would depend largely on their location, magnitude, and frequency of occurrence. These indirect impacts would not mitigatable because people's actions could not be controlled at all times.

More specific indirect impacts are discussed below; they are discussed by species or groups of species. All wildlife species, known or expected to inhabit the Savery area, have been considered in this analysis; however, only those species significantly affected by the project are discussed.

Under the No Development Alternative, wildlife habitat and animal populations would remain near the status quo. Therefore, only the Development Alternative is addressed under the Environmental Consequences section. The possibility exists that the impacts discussed under the Development Alternative would simply be delayed. In other words, development could occur sometime in the future. This would happen if at a later date the coal were leased through the competitive coal leasing program. Another possibility would be that wildlife impacts could occur elsewhere if the PRLA coal were exchanged. Since it is not known what form an exchange would take or where development would occur as a result of an exchange, it is not possible to analyze the wildlife tradeoffs. However, any other mineral or coal developed through an exchange would have gone through public scrutiny of the BLM planning process and environmental analyses.

Elk

Introduction

Elk would be impacted by the Development Alternative. Development of the Savery project would involve increased human disturbance and disturb many of the habitat types used by the elk population.

Affected Environment

Map 8 shows the elk habitat within the project area. The entire portion of the project area in Colorado and over 50 percent of the project area in Wyoming are delineated as part of the Battle Mountain/Horse Mountain elk crucial winter range (CWR). A CWR is that range which supports the base population during a severe winter. Animals are forced onto this limited range because of surrounding snow depth. Approximately 1,000 elk winter within the Battle Mountain/Horse Mountain CWR. This is approximately one-third of the 3,200 elk that winter within the Baggs Data Analysis Unit (DAU). The wintering population within the Colorado portion of the project area is approximately 400 elk. This is 5 percent of the 7,800 elk wintering within the Colorado herd unit and 27 percent of the elk wintering within the Game Management Unit (GMU)-5 herd, a subunit of the herd unit.

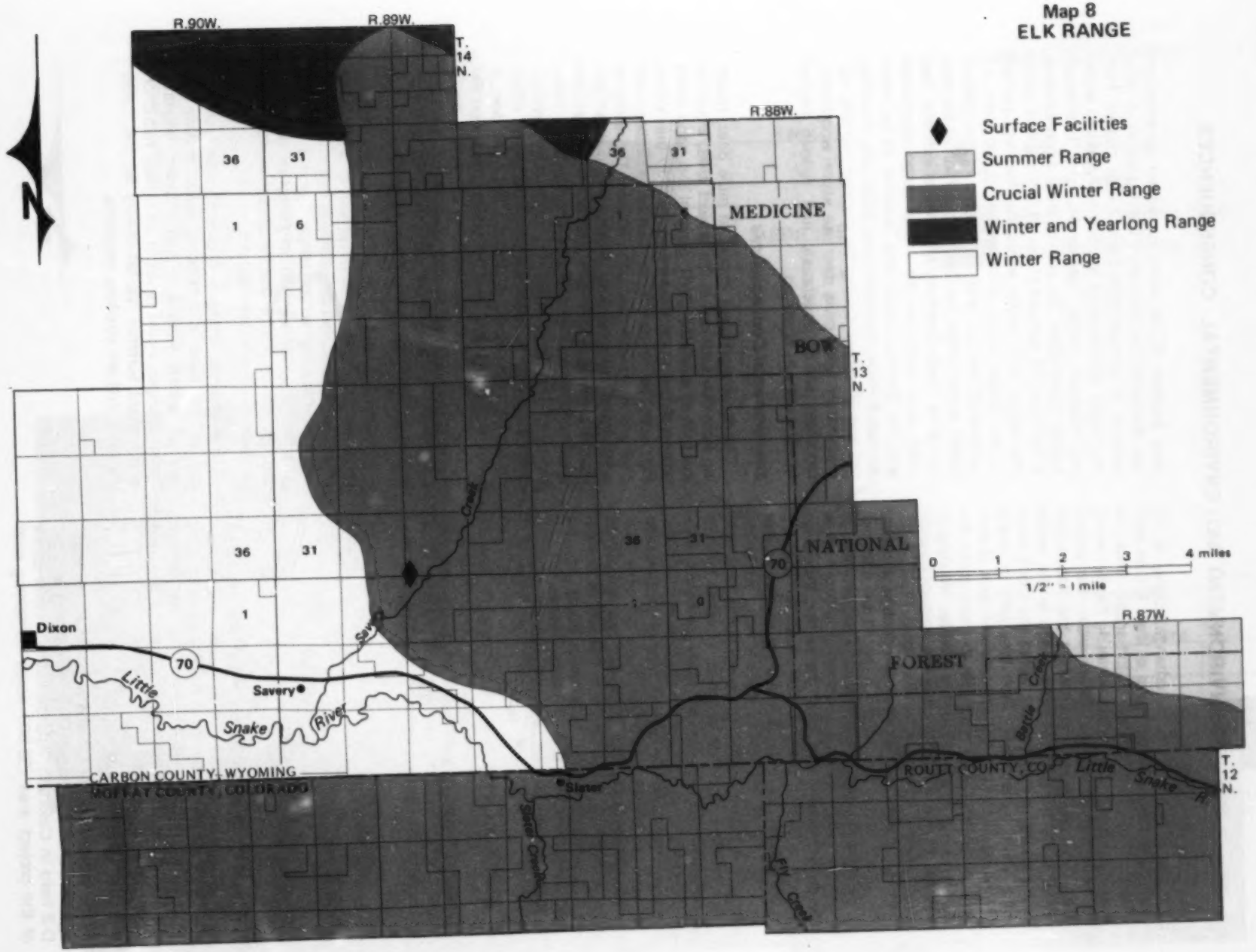
Vegetation found on the exposed, windswept slopes receives the highest use in winter. These slopes are usually south to west facing and are covered with sagebrush or mountain shrub habitat types. During periods of mild weather, the aspen thickets provide important thermal cover for the elk.

The majority of the wintering elk from the project area move to higher elevations in the Sierra Madres during the summer. The summer elk population within the project area is approximately 50 to 60 elk. Aspen woodland habitat and the aspen-sagebrush ecotone are the most important areas to summering elk. These areas provide feeding sites, security, and thermal cover for the resident elk population.

The Rawlins District BLM and the U.S. Forest Service's Rocky Mountain Forest and Range Experiment Station are currently in the second year of a five-year elk study. This study is focusing on CWR habitat and boundaries, elk use and preferences within the CWR, migration routes, and competition with other ungulates in the Baggs DAU.

Environmental Consequences

The timing and juxtaposition of mine facilities, residential units, and the increase in human activity would play a significantly greater role in affecting


Map 8
ELK RANGE
Surface Facilities
Summer Range
Crucial Winter Range
Winter and Yearlong Range
Winter Range
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
0 1 2 3 4 miles
1/2" = 1 mile
Dixon
Savery
Slater
Little Snake River
Battle Creek
Slater Creek
Fill Creek
70
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO

elk than actual mining disturbance. Eighty to 85 percent of the elk would move at least ½ mile (line-of-sight) from unpredictable disturbances. Thus, the continuity of the use of the wintering habitat would be disrupted by human activity within the project area. This disruption would inhibit the free movement of elk from the summer range to the winter range as well as movement within the CWR itself. Elk expend more energy than they take in during the winter. Harassment by people and lack of suitable cover would cause the elk to move more frequently and thereby use more energy, resulting in lower energy reserves to carry the animals through winter. Lower energy reserves would result in increased mortality and lower reproductive success. Anywhere from 25 to 500 elk would be affected, depending on the placement and occurrence of human activities. (This wide range of affected elk is the professional judgment of the author; the range refers to a best- and worst-case situation.) This is 2 to 36 percent of the elk wintering in the project area or 1 to 16 percent of the elk wintering in the Baggs DAU. The ability of adjacent winter ranges in Wyoming to support displaced or affected animals is currently unknown. The elk study will help quantify these impacts. The Colorado Division of Wildlife believes that adjacent winter ranges in Colorado are not capable of supporting displaced mule deer or elk. Colorado Division of Wildlife representatives further conclude that, "Colorado Division of Wildlife post-season population objectives could not be maintained, resulting in a long-term downward trend in mule deer and elk population." (Wildlife Analysis, 1981).

Aspen woodlands and other riparian habitat would be altered where reduction of groundwater recharge to surface waters occurred. Elk use this vegetation for foraging, security, and thermal cover throughout the spring, summer, fall, and mild winters.

Mule Deer

Introduction

The mule deer population within the proposed development area would be adversely affected by the Development Alternative. Habitat alteration, as well as human disturbance, would be the primary factors that would affect the resident and wintering mule deer populations.

Affected Environment

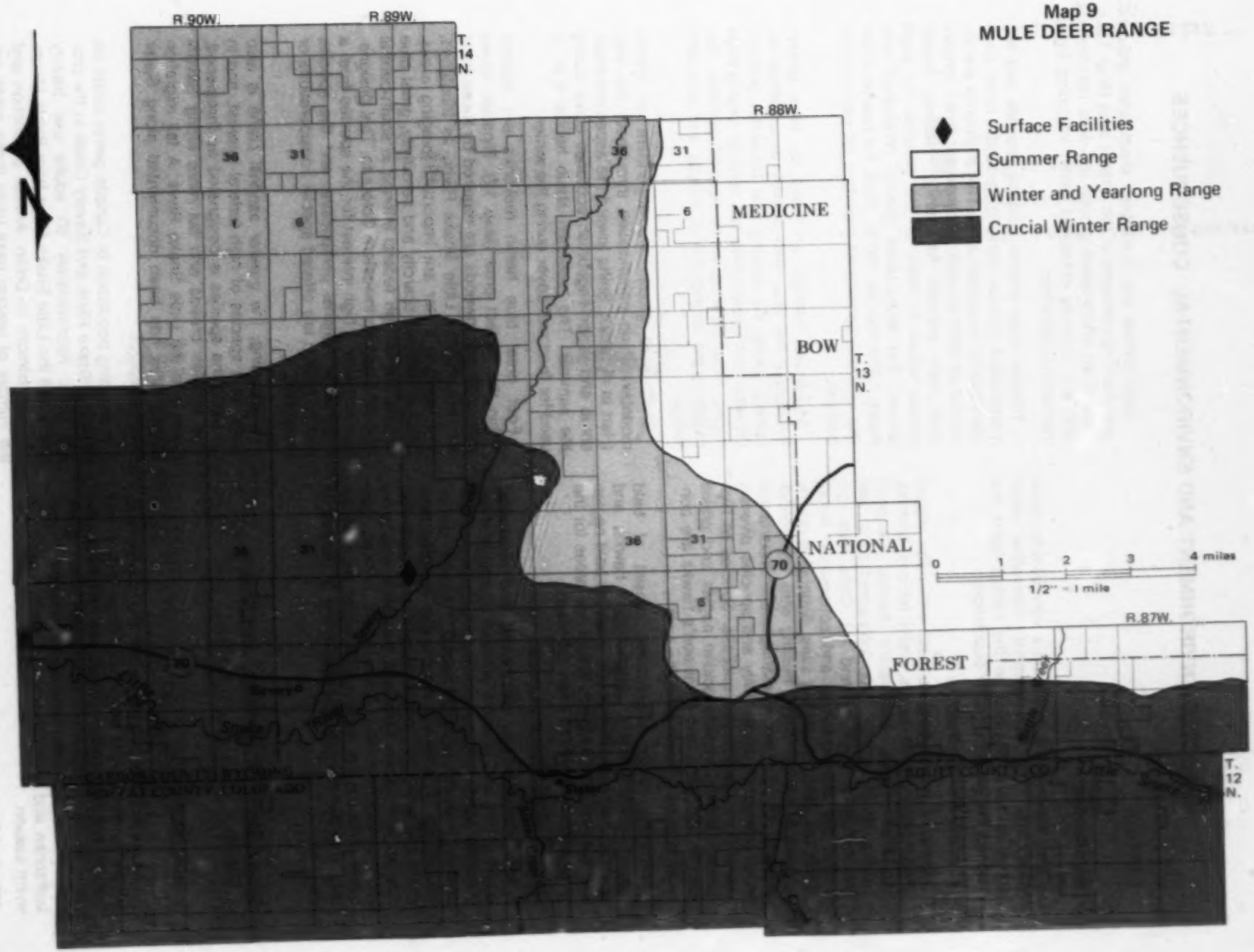
The project area is located within two herd management units: the Baggs DAU in Wyoming and the D-2 herd in Colorado. Approximately 71,200 acres of the project area (53,000 acres containing coal plus another 18,200 acres for added construction) are delineated as mule deer CWR (Map 9). A large number of animals from these herds migrate from the higher elevations of the Sierra Madres to winter on mountain shrub, sagebrush, and bitterbrush habitat types within the project area. Approximately 4,100 deer, 32 percent of the 13,000 animals within the Baggs DAU, winter within the Wyoming portion of the project area. An estimated 2,000 deer, 11 percent of the D-2 and 27 percent of the GMU-5 herds, winter within the Colorado portion of the project area. Radio telemetry information indicates that mule deer, which use the crucial range associated with the Savery project area, summer as far away as Hahns Peak, Colorado, and Miller Hill, Wyoming (40 and 50 miles). During the summer months, approximately 1,400 mule deer use aspen woodlands, mountain shrub, sagebrush, and riparian habitat types, mostly in Wyoming.

Environmental Consequences

The most significant impact to mule deer, resulting from development in the project area, would be the loss of available CWR. Several thousand acres are predicted to become unavailable to the wintering deer as a result of human activities and changes in present land-use patterns. The ability of adjacent winter ranges in Wyoming to support displaced animals is unknown. Recent U.S. Fish and Wildlife Service studies (Rippe and Rayburn, 1981) indicated that land used for community development appeared to have the most damaging effect on big game populations. About 1,100 mule deer, 8 percent of the Baggs DAU population, winter on the 21,000 acres of private land, which would be in demand for residential and commercial development. The number of deer using this area would be considerably higher during a severe winter.

Between 800 and 1,125 acres of surface disturbance are projected for development of the project area. On-site disturbance, although important as an agent in reducing winter range carrying capacity (and thus population levels), might not be as significant as the long-term loss of crucial winter range because of off-site development.

Other impacts, changes in groundwater recharge and surface water distributions, would include the loss of aspen woodland and riparian habitats. These changes would result in an overall reduction of important summer habitat quality for the 1,400 plus deer that are yearlong residents.


Map 9
MULE DEER RANGE
Surface Facilities
Summer Range
Winter and Yearlong Range
Crucial Winter Range
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
70
0 1 2 3 4 miles
1/2" = 1 mile

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Raptors

Introduction

The Savery area maintains a very diverse raptor population. The Development Alternative would have an adverse effect on the habitat types that support the yearlong raptor populations.

Affected Environment

Birds of prey known to nest within the project area include golden eagles, prairie falcons, kestrels, red-tailed hawks, Swainson's hawks, Cooper's hawks, great horned owls, long-eared owls, and marsh hawks (Maps 10 and 11). Cliffs, rock outcrops, aspen woodlands, and cottonwood woodlands are used as nesting sites, depending on the species of raptor. These nesting sites are considered to be of primary management importance, since population productivity and species diversity depend on reproductive success. Species of high federal interest include golden eagles and prairie falcons. Cooper's and Swainson's hawks are considered to be uncommon in the area.

Wintering raptor populations consist of bald eagles, golden eagles, rough-legged hawks, and great horned owls. Winter use areas for bald eagles are delineated on Map 12. Winter use areas for the other species have not been delineated.

Environmental Consequences

Mine development, commercial and residential construction, and possible adverse hydrological impacts to aspen and cottonwood stands would decrease suitable nesting habitat. Human disturbances would cause some raptors to abandon their nests and attempt to locate elsewhere. Cottonwood riparian and aspen woodland habitat is scarce in south-central Wyoming. Therefore, it is likely that development in the project area would significantly decrease the diversity and production of raptors in the area.

Game Birds, Waterfowl, and Shore Birds

Introduction

The varied habitat types within the Savery area support a diverse bird population. Sage grouse and Columbian sharp-tailed grouse are yearlong residents of the sagebrush and mountain shrub types. Herons, cranes, geese, and ducks inhabit the riparian zones and wetland areas, primarily during the warm season.

Affected Environment

Sage grouse and Columbian sharp-tailed grouse are yearlong residents of the project area (Map 13). Columbian sharp-tailed grouse are less numerous and are currently protected within Wyoming by a no-hunting restriction.

Thirteen sage grouse strutting grounds and two sharp-tailed grouse dancing grounds have been identified in the project area. These grounds are essential for both species, because the birds concentrate here annually for mating. Nesting usually occurs within 2 miles of the grounds for sage grouse and sharp-tailed grouse (Wallestad and Pyrah, 1974; Pepper, 1972). Thus, the habitat within this radius is considered important for reproductive success.

Sagebrush habitats are used by sage grouse throughout the year, with primary dependence occurring during the nesting and fall-winter periods. Wetland and riparian sites are used by sage grouse during brood rearing in spring and summer, because of the abundance of insects and succulent forage.

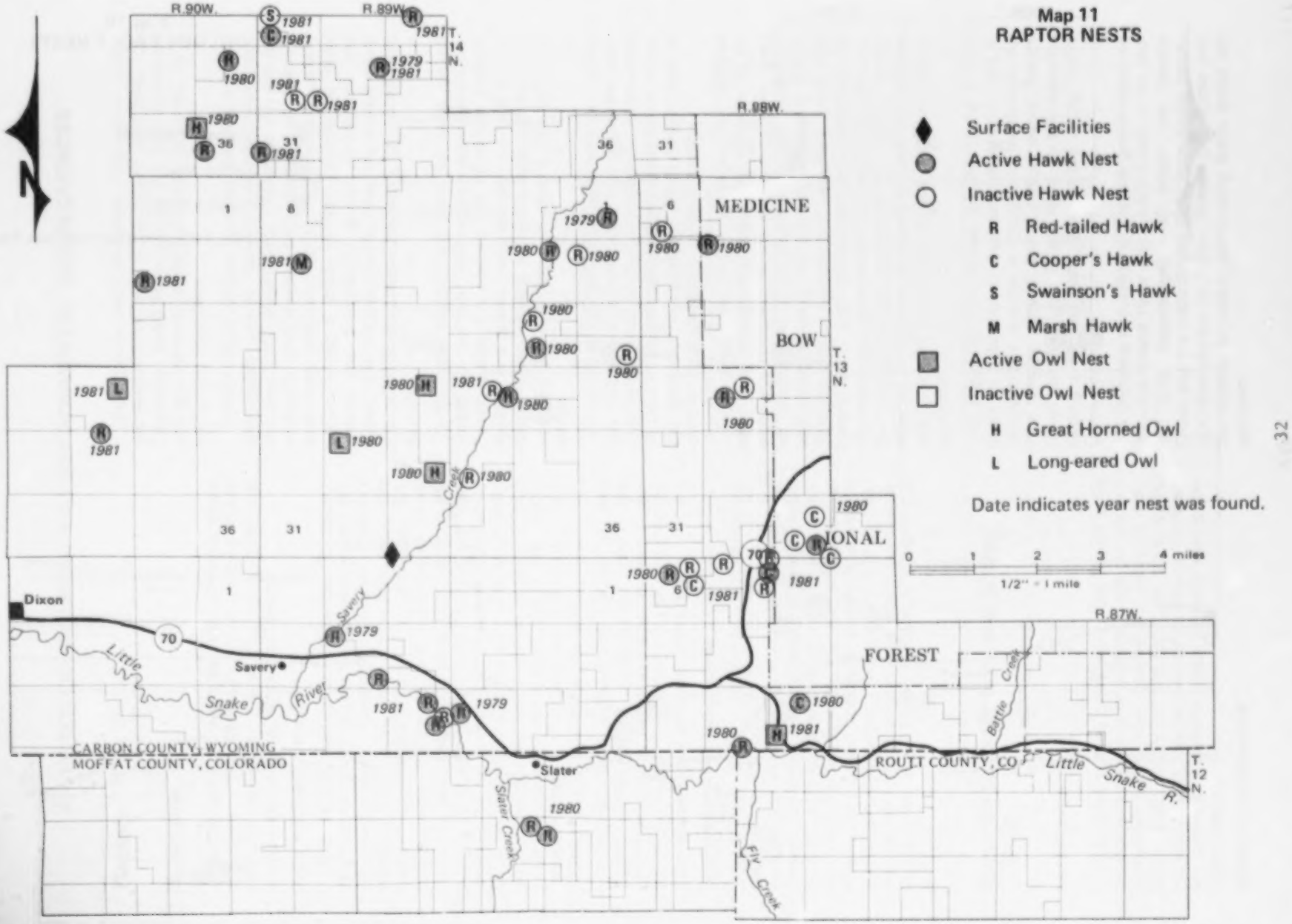
Sharp-tailed grouse are dependent on climax mountain shrub communities throughout the year (Hart et al. 1950). Shifts toward the aspen-mountain shrub and aspen-sagebrush ecotones occur during the summer. The mountain shrub habitat type is used for food and cover during the winter.

Four great blue heron rookeries are located within the project area (Map 12). Riparian zones with large cottonwoods are required by these birds for nesting. The Little Snake River, its tributaries, and standing water are important foraging areas. Because of their scarcity and sensitivity, great blue herons are of high federal interest in south-central Wyoming and northwestern Colorado. This designation indicates a high interest for the species from a regional or national perspective, and the species and its habitat are offered special considerations or protection.

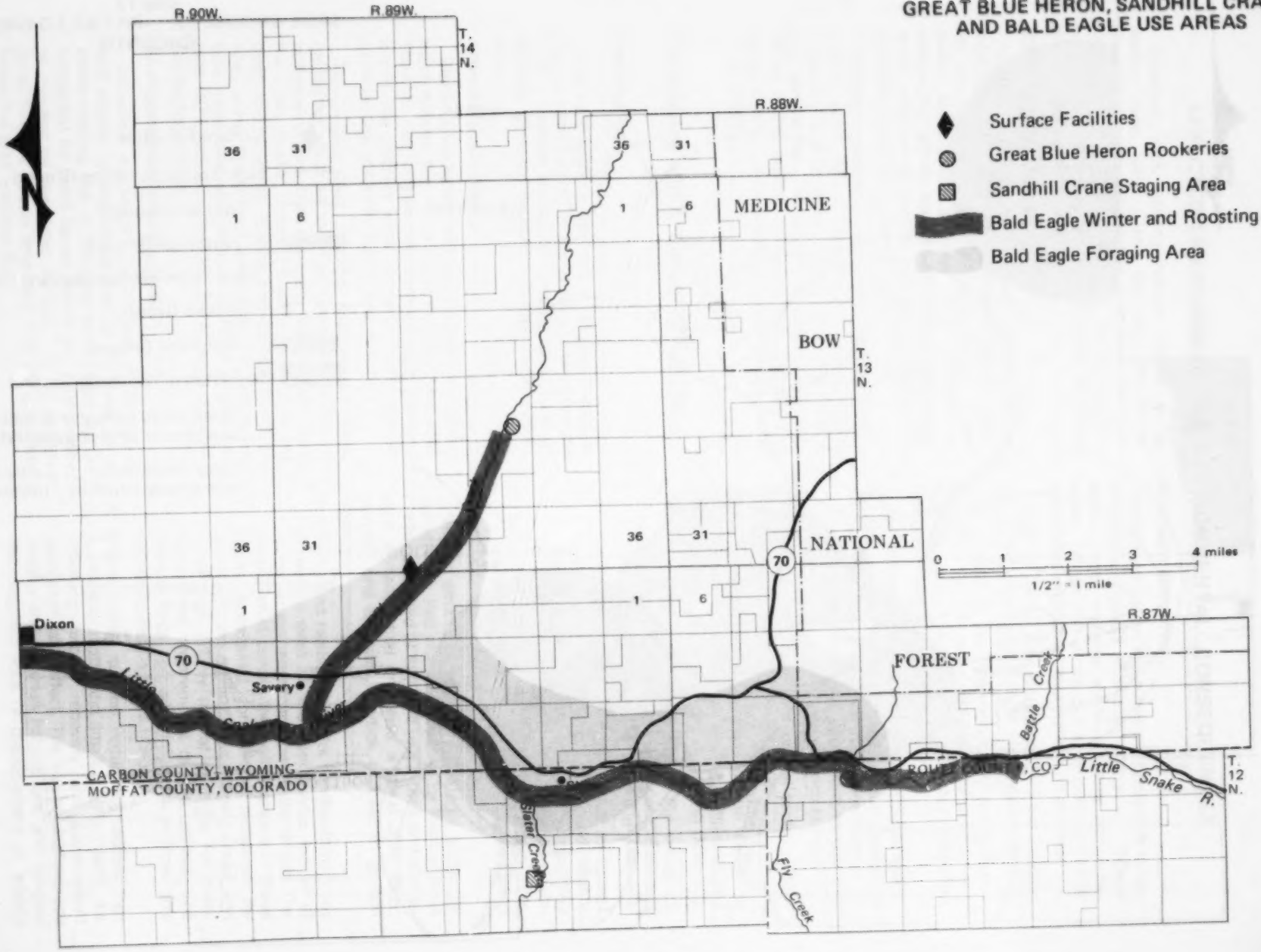
In Wyoming, the greater sandhill crane is also listed as a species of high federal interest, and in Colorado the species is designated as threatened. This species breeds and summers along Savery Creek and the Little Snake River. A fall migration staging area has been documented along Slater Creek (Map 12).

A breeding population of Canada geese exists on the Little Snake River and Savery Creek in the project area. Approximately 50 adults use Savery Creek and the Little Snake River from Battle Mountain downstream to Dixon. Annual production and the number of nesting pairs using these areas are unknown.

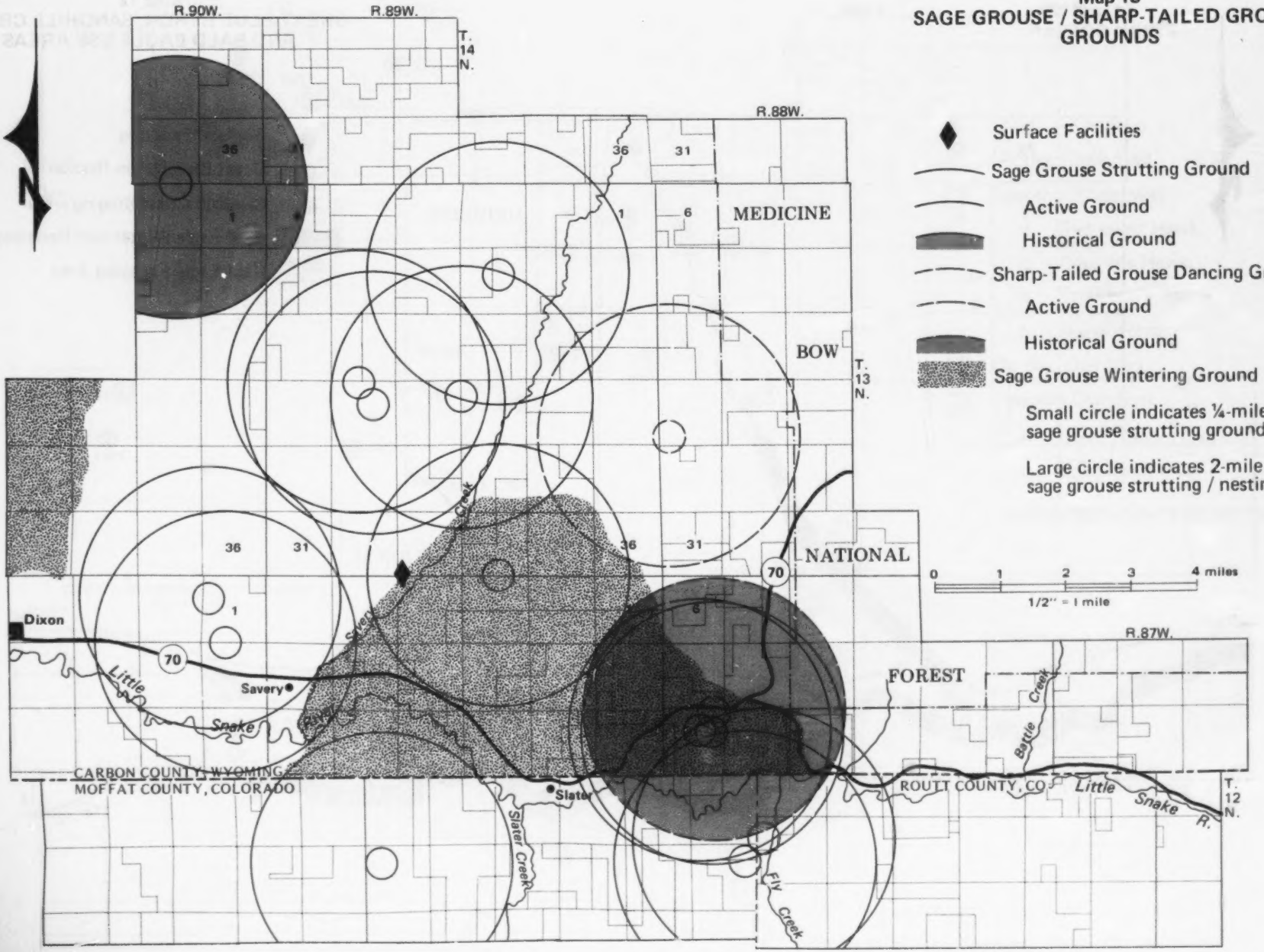
Map 10
GOLDEN EAGLE NESTS
Surface Facilities
Active Nest
Inactive Nest
Date indicates year nest was found.
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
1979 1980 1981
1979 1980
1980
1981
Dixon
Savery
Slater
Little Snake River
Savery Creek
Slater Creek
Fly Creek
Battle Creek
Little Snake R.
70
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO
0 1 2 3 4 miles
1/2" = 1 mile


Map 11
RAPTOR NESTS
Surface Facilities
Active Hawk Nest
Inactive Hawk Nest
R Red-tailed Hawk
C Cooper's Hawk
S Swainson's Hawk
M Marsh Hawk
Active Owl Nest
Inactive Owl Nest
H Great Horned Owl
L Long-eared Owl
Date indicates year nest was found.
0 1 2 3 4 miles
1/2" = 1 mile
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
FOREST
Dixon
Savery
Slater
70
Little Snake River
Savery Creek
Slater Creek
Battle Creek
Fly Creek
Little Snake R.
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO

Map 12
GREAT BLUE HERON, SANDHILL CRANE, AND BALD EAGLE USE AREAS



Map 13
SAGE GROUSE / SHARP-TAILED GROUSE GROUNDS



Important duck nesting habitat occurs along Savery Creek, Slater Creek, and the Little Snake River. This nesting habitat is significant because dependable water sources and aquatic/riparian vegetation are scarce in south-central Wyoming and northwestern Colorado.

Environmental Consequences

Human activities and surface disturbance on sage grouse strutting and sharp-tailed grouse dancing grounds during the breeding season would impair reproductive success. Also, numbers of sharp-tailed grouse could be signficantly lowered by larger numbers of hunters who could mistake the protected species for sage grouse.

Increased sediment load and increased human activity would disrupt breeding and brood rearing areas for Canada geese, ducks, great blue herons, and greater sandhill cranes. It cannot be determined if the greater sandhill crane staging area along Slater Creek would be abandoned under these conditions.

Threatened and Endangered Species

Introduction

The bald eagle is the only endangered species that has been found in the proposed development area. Increased human disturbance could have an adverse effect on the wintering bald eagle population.

Affected Environment

Black-footed ferrets and bald eagles are federally listed species that could occur in the project area. The U.S. Fish and Wildlife Service (1981) surveyed prairie dog colonies within the project area and determined that no ferret activity was evident.

The project area contains documented winter habitat for about six to 10 bald eagles that use the cottonwood river bottoms along Savery Creek and the Little Snake River. These birds roost in the trees and feed on rabbits and carrion found on sites within the project area (Map 12). An active bald eagle nest was present on PRLA W-0324042 until 1977, indicating that the Savery area is potential nesting habitat.

Environmental Consequences

Increased disturbance by humans might cause bald eagles to discontinue use of the area as a winter roosting site. A biological assessment will be completed for black-footed ferrets and bald eagles as required by law under Section 7 of the Endangered Species Act, as amended. This will occur between the draft and final EIS.

Mitigation Measures

Wildlife mitigation measures are applicable to unpredictable impacts that may occur on federal lands. These impacts would probably affect between 125 to 150 acres out of a total of 71,000 acres affected by the Development Alternative.

None of these mitigation measures will mitigate any of the significant impacts identified in this EIS.

As a result of the coal unsuitability criteria (numbers 11, 13, 14, and 15), the BLM multiple-use analysis, and this EIS, the following mitigation measures have been proposed.

1. The following areas, which occur on public lands, are restricted to very limited surface operations and occupancy. These areas are subject to stipulations for specific placement, design and type of facilities, and seasonal occupancy.

   a. Elk and mule deer crucial winter ranges (Map 8).

   b. Within a 2-mile radius of the center of sage grouse strutting/nesting complexes and sharp-tailed grouse during nesting (Map 13).

   c. Within a ¼-mile radius of the center of sage grouse strutting/nesting complexes and shartp-tailed grouse during nesting (Map 13).

   d. Within delineated buffer zones, as agreed on by BLM and the U.S. Fish and Wildlife Service (USFWS) during the coal unsuitability criteria reveiw around golden eagle nests, prairie falcon aeries, great blue heron rookeries, and sandhill crane nesting areas (Map 12).

   Nesting structures and those features within the buffer zone that make it suitable for nesting shall not be disturbed at any time (e.g., trees and associated wetlands that comprise a great blue heron rookery, and cliff sites, rimrock, or trees for golden eagles).

2. Staging and nesting areas for sandhill cranes are known to exist on the permit area, but all of these areas have not been identified. The lessee shall survey the permit area and those areas considered for off-site mitigation for sandhill crane nesting sites, staging areas, and other high priority habitat essential for maintaining the requirements of this species. The lessee shall provide information from this survey to BLM and the USFWS.

3. Where limited surface occupancy occurs (i.e., ventilation shafts and small access roads), the following habitat recovery and replacement plan shall take effect. The lessee shall replace wildlife and fisheries habitat loss and mitigate the resultant loss or displacement of wildlife

species. Concurrently with the filing of the mine plan, the lessee shall submit for approval to BLM and USFWS, a habitat recovery and replacement plan for protection or enhancement of wildlife and fisheries populations affected by habitat loss or displacement from historic habitat. The habitat recovery and replacement plan, which will be based on estimates of lost and disturbed habitat, shall be developed in consultation with BLM, USFWS, the Colorado Division of Wildlife, and the Wyoming Game and Fish Department. The habitat recovery and replacement plan shall indicate the proven methods to be employed by the lessee, which will ensure that the post-mining vegetative community has the diversity and density of the pre-mining community and utilizes the species occurring naturally on the area. This will promote post-mining use by existing wildlife species. Mitigation methods may require the lessee to employ techniques for wildlife range manipulation or intensive wildlife range management. Mitigation during the mining and reclamation stages may be accomplished on lands outside the permit area that have been made available through the surface management agency, the state, or the lessee, in combination with recovery and replacement methods on suitable lands within the permit area. The habitat recovery and replacement plan will include the following:

a. A habitat analysis of the permit area and those areas considered for off-site mitigation that identifies: (1) distribution of important wildlife species (game, nongame, sensitive species, species of high federal interest, and threatened and endangered species); (2) distribution of important standard habitat types; and (3) the relationship between the wildlife species and the standard habitat types that occupy the areas.

b. A detailed description of the methods selected by the lessee to mitigate habitat loss during the mining and reclamation phases, together with a comparative analysis of alternative methods that were considered and rejected by the lessee and the rationale for the decision to select the proposed methods. The methods used by the lessee for recovery and replacement may include, but are not limited to, the following techniques: increasing the quantity and quality of forage available to wildlife and fisheries; acquisition of critical wildlife and fisheries habitats; mechanical manipulation of low quality wildlife or fisheries habitat to increase habitat value for selected wildlife or fish species; recovery, replacement, or protection of important wildlife habitat by selected fencing.

c. A timetable giving the periods of time that will be required to accomplish the habitat recovery or replacement plan, showing how this timetable relates to the overall mining plan.

d. An evaluation of the final plan by the Colorado Division of Wildlife and the Wyoming Game and Fish Department. State officials shall comment on the methods selected and the techniques to be employed by the lessee and may recommend alternate recovery or replacement methods.

The lessee shall develop and implement a comprehensive monitoring program to measure the effectiveness of the habitat recovery and replacement plan outlined above. Baseline data collection for comparison purposes will begin immediately on leasing of the PRLAs. The success of a given recovery or replacement method will be determined by criteria established jointly by BLM, USFWS, Colorado Division of Wildlife, and the Wyoming Game and Fish Department.

Irreversible and Irretrievable Commitments of Resources

Those impacts resulting from residential and commercial construction would be irreversible and irretrievable. Those impacts associated with human disturbance would cease when the mine closed and people left the area seeking new jobs. Except for rare species at low population levels, wildlife is a renewable resource. Once these people leave the Savery area, wildlife would again be able to use the habitat and their numbers would increase.

Conclusion

Development of the Savery PRLAs could adversely affect up to 500 elk, 1,100 mule deer, numerous raptors, including bald eagles, sandhill cranes, great blue herons, geese, ducks, sage and sharp-tailed grouse, and game fish. Although some of these impacts would be individually significant, the cummulative impact would be even greater.

The Savery area contains habitat essential to the survival of numerous wildlife species. This type of habitat is rare in south-central Wyoming, which adds to the area's significance for wildlife in the state.

Most of the previously described wildlife impacts are vague. This is because their degree of significance is directly related to unpredicatable changes in human activities and land use. Consequently, wildlife-coal development tradeoffs must be expressed in terms of the risk of significantly affecting wildlife. Since wildlife values in the vicinity of the

Little Snake River Valley are among the highest in south-central Wyoming and northwestern Colorado, there is a high probability that large human population increases in the area will conflict significantly with wildlife. If coal development is allowed to proceed in the Savery area, the risk is high that significant unmitigatable wildlife impacts will occur.

WATER RESOURCES

Groundwater

Introduction

Inflow of groundwater into active mining areas would have to be pumped from the mine, treated, and disposed. Water passing through mined areas would become contaminated and lower water quality in the area. Mining activities could also lower water tables and adversely affect stream flow.

Affected Environment

Groundwater occurs in water table (unconfined) and artesian (confined) conditions in sedimentary rocks. The main sedimentary formations in the Savery project area are the Brown's Park and Mesaverde formations. Formations between the Mesaverde down to the Tensleep formation are probably poor aquifers. Individual, water-bearing units within the formations may differ greatly in thickness and extent, but they probably are interconnected sufficiently to permit indirect or partial hydrologic connection in varying degrees (Welder and McGreery, 1966).

The Mesaverde Formation consists of alternating layers of sandstone and shale, interspersed with coal seams. The principal aquifers are the sandstone layers and coal seams. The coal-bearing Almond Mesaverde Formation extends from Atlantic Rim in the north to Savery in the south.

Water is being discharged from the Mesaverde Formation, where it has been cut by Savery Creek, at the rate of 0.9 cubic feet per second per mile of stream. Recharge appears to come from precipitation on the Fort Union Formation, which overlies the Mesaverde Formation, and from stream flow from the crystaline rocks of the Sierra Madres (Aldridge, 1977). The general direction of water movement is to the west and northwest along the dip of the geological structure, but water also moves downward across the strata. Faulting in the area may influence water movement (Aldridge, 1977). In Colorado, recharge water comes from high northern sloping areas and flows downward toward the valleys of Slater, Fly, and Cantling creeks.

The towns of Savery, Dixon, and Baggs all derive their water supply from shallow wells. These wells are replenished by infiltration from the Little Snake River; the well system at Baggs is reported to produce up to 800 gallons per minute.

Groundwater, except for that underlying perennial streams, is generally a calcium-magnesium-sulfate or a magnesium-calcium-sulfate type that is of marginal, or unsuitable, quality for domestic use but is suitable for use by livestock and wildlife. Dissolved solids in water obtained from perched aquifers generally range from 750 to 1,500 milligrams per liter.

Environmental Consequences

Inflow of groundwater into active mining areas would interfere with the mining operation. The removal of this water by sump pumps would decrease the amount of groundwater recharge. Resultant lowering of water tables would cause drying of springs and drawdowns in existing wells. Depending on the location of the well and extent of drawdown, some wells could become unusable or would have to be drilled to a deeper level to remain functional. This impact would occur during mining and for an undetermined time afterward.

Mining and subsidence near and under Savery and Slater creeks and the Little Snake River could interrupt groundwater recharge from aquifers to streams. Groundwater recharge to streams provides essential stream water levels, especially during late summer after snowmelt has diminished, to support adjacent wetlands and alluvial valley floors. Any reduction of stream flows might involve water rights on the affected streams. The Wyoming State Engineer and water right permittees would have to be consulted for approval of the reductions, implementation of mitigation measures, or purchase of the rights.

The company has proposed to use groundwater encountered during mining to supply a majority of the water required for the on-site handling of the coal. This water, once used, would be treated to meet existing Wyoming water quality standards and then discharged into surface waters. However, these treated waters would be of lower quality than those waters now entering the streams. Groundwater moving through formations disrupted by mining and eventually reaching the surface might be of lower quality also. The placement of surface facilities, especially septic tank distribution fields, could result in the contamination of groundwater and Savery Creek by sewage effluent.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Surface Water

Introduction

No significant impacts are expected for surface water.

Affected Environment

Surface water in this area consists of stockwater ponds; Savery, Slater, Fly, and Cantling creeks; and the Little Snake River. Stream flow data for area streams is shown on Table 6; locations of gauges are shown on Map 14. (No data is available for Fly and Cantling creeks.)

Surface water quality in this area is considered good. For example, during spring runoff, the water, a calcium-bicarbonate type, contains less than 250 milligrams per liter of dissolved solids. In the summer and fall, as runoff decreases and groundwater discharges become the predominant water source, dissolved solids may increase to 1,400 milligrams per liter. Upland slopes in this area tend to be protected from excessive erosion by good plant cover and virtually all stream channels appear to be stable. Sediment yields to Savery Creek, Little Snake River near Slater, and Little Snake River near Dixon are .11, .08, and .16 acre-feet per square mile per year respectively (Andrews, 1978).

Environmental Consequences

Increased water use for domestic purposes has been estimated in Table 7.

Estimated water use by the mine is a small fraction of the estimated groundwater intercepted (.7 cubic feet per second) that would be diverted to Savery Creek.

The combined values of water used by the proposed mining and attendant increased population is insignificant. It is smaller than the error involved in the measurement of stream flow of Savery Creek at the mine site. Also, water use is insignificant compared to the present uses by irrigation (about 38 cubic feet per second) and export for the city of Cheyenne (about 10 cubic feet per second), and it becomes even more insignificant when compared with the projected uses by the year 2000 by industry and Stages II and III of the Wyoming Water Development Plan for the Little Snake River Basin. Since no reduction in groundwater contribution to stream flow is foreseen, and since the totally consumed part of the estimated domestic and mine water use is so small, no impact to stream flow is anticipated.

Floodplains

Introduction

During the life of the mine, there is a 100 percent probability that the Little Snake River will exceed its banks by 2 feet and a 36 percent probability that it will exceed its banks by 4 feet.

Affected Environment

Floodplains were identified through consultation with the U.S. Geological Survey and application of the coal unsuitability criteria (43 CFR 3461.1) and are shown on Map 15.

Environmental Consequences

Construction activities in floodplains would increase the danger of downstream damage from flooding. Location of the surface facilities in the Savery Creek floodplain would subject these facilities to the threat of flood damage.

Bank-full stage of the Little Snake River near Dixon has an estimated recurrence probability of flooding of about 80 percent and a 100 percent certainty of flooding during one development/coal production cycle of about 50 years. An urbanized Little Snake River floodplain could expect a flood 2 feet higher than the out-of-bank flow with an 18 percent chance of flooding within any one year and a 100 percent certainty of flooding within one mining cycle. A flood higher than 4 feet above the out-of-bank flow has a probability of .9 percent chance of recurrence and a 36 percent chance of occurring within the life of the mine. The current sparse population that inhabits the floodplain has not yet experienced too much stress with flooding and probably occupies the more desirable and higher areas next to the river. An increase 10 to 15 times the valley's present population (as predicted) would populate lower sections of the streambank. This would increase the obstruction to flood flows and cause even higher flood stages.

The channel capacity at the mine site is estimated to be about 1,400 cubic feet per second. This flow has about a 36 percent probability of recurring and a 100 percent chance of flooding during the life of the mine. A flood 2 feet higher than the out-of-bank flow has an estimated recurrence probability of about .8 percent and a probability of occurrence during one mining cycle of 33 percent.

Alluvial Valley Floors

Through application of the coal unsuitability criteria, a preliminary determination was made that

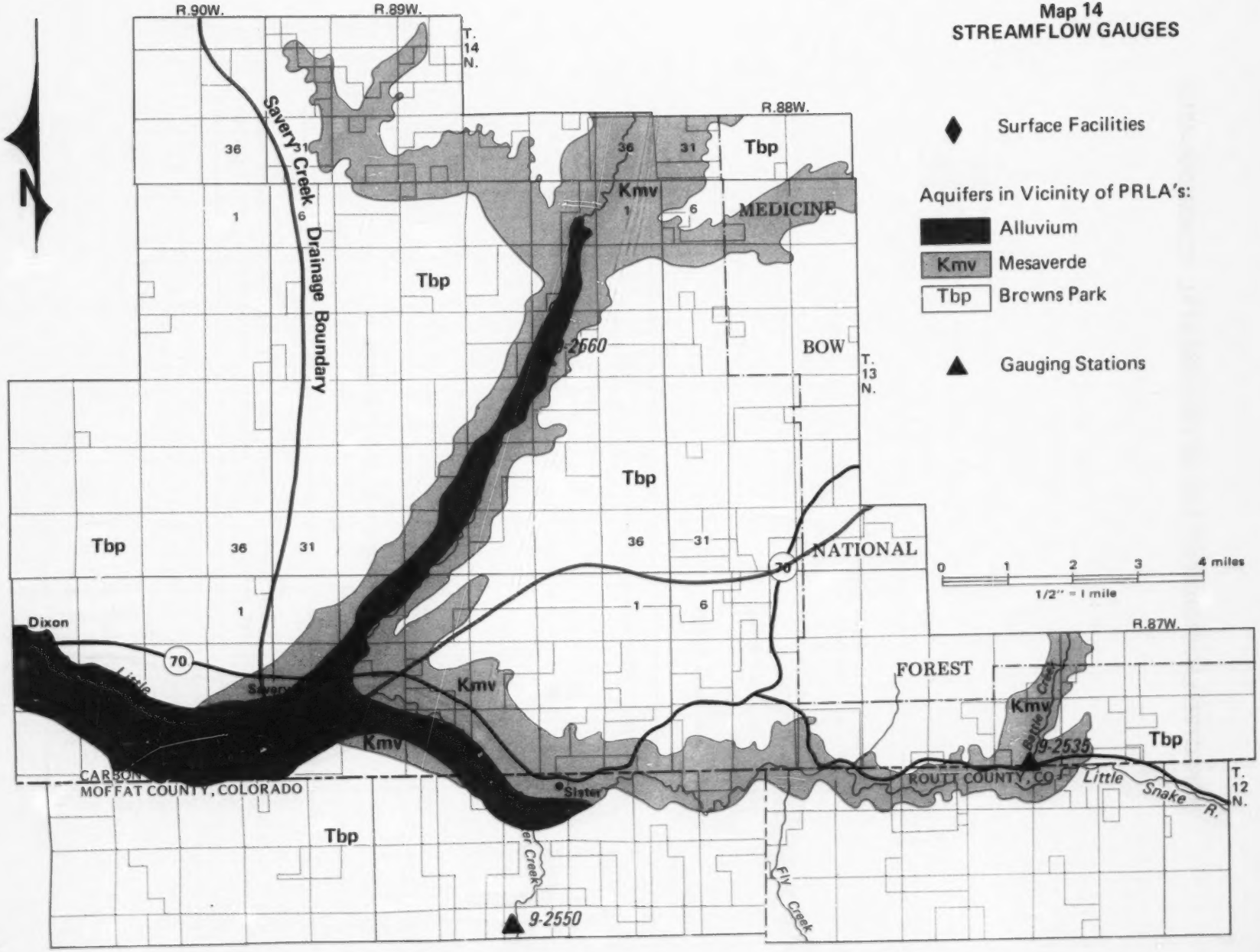

Map 14
STREAMFLOW GAUGES
Surface Facilities
Aquifers in Vicinity of PRLA's:
Alluvium
Kmv Mesaverde
Tbp Browns Park
Gauging Stations
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
Savery Creek Drainage Boundary
MEDICINE BOW
NATIONAL FOREST
Dixon
Sister
CARBON
MOFFAT COUNTY, COLORADO
ROUTT COUNTY, CO
Little Snake R.
Battle Creek
Fly Creek
9-2660
9-2535
9-2550
0 1 2 3 4 miles
1/2" = 1 mile

TABLE 6

STREAMFLOW

Station Description	Minimum Flow (cubic feet per second)	Average Flow (cubic feet per second)	Maximum Flow (cubic feet per second)
North Fork Little Snake River near Slater, Colorado	28	222	1,044
Little Snake River near Dixon, Wyoming	17	471	2,317
Slater Creek near Slater, Colorado	0	74	1,860
Savery Creek near Savery, Wyoming	0	104	2,670

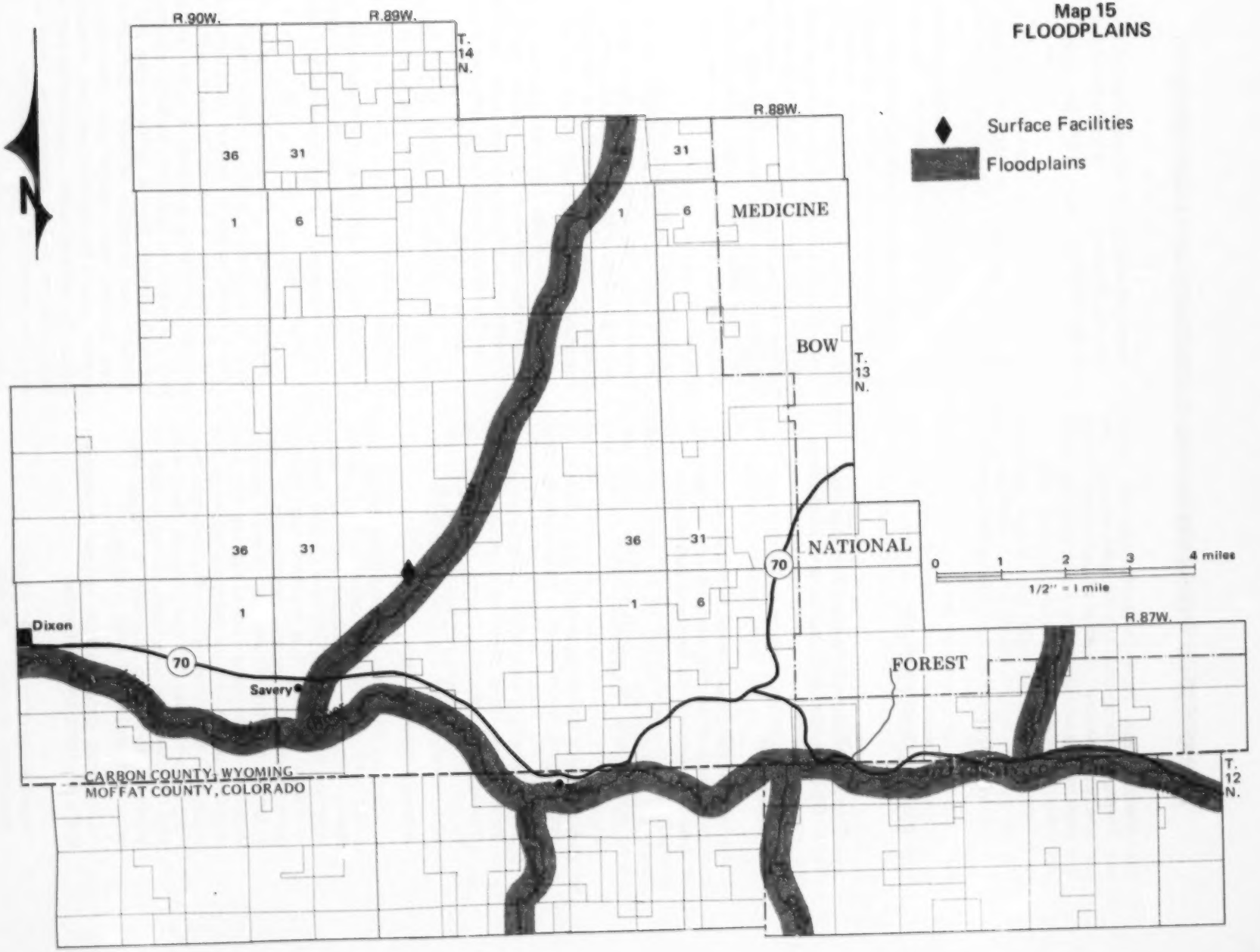
Source: USGS, Water Resources Data for Wyoming, 1980.

TABLE 7

INCREASE IN WATER CONSUMPTION[1/]

Coal Production (million tons per year)	1985 (cubic feet per second)	1992 (cubic feet per second)	1999 (cubic feet per second)	2028 (cubic feet per second)
4	0.2	0.9	1.5	0.7
5	0.4	1.4	1.9	0.7
6	0.4	1.6	2.3	1.1
7	0.4	1.6	2.6	1.5

[1/] Increased since 1980.


Map 15
FLOODPLAINS
Surface Facilities
Floodplains
R.90W.
R.89W.
R.88W.
R.87W.
T. 14 N.
T. 13 N.
T. 12 N.
MEDICINE
BOW
NATIONAL
FOREST
Dixon
Savery
70
0 1 2 3 4 miles
1/2" = 1 mile
CARBON COUNTY, WYOMING
MOFFAT COUNTY, COLORADO

Savery Creek, Slater Creek, and the Little Snake River contain possible alluvial valley floors. There are approximately 135 acres of cottonwood-riparian vegetation and 320 acres of cropland per linear mile of alluvial valley floor.

Impacts to alluvial valley floors will be addressed in the mine and reclamation plan environmental document prepared by the Office of Surface Mining.

TRANSPORTATION

Transportation Systems for Mining Operations, Railroads, and Highways

Introduction

Within the project area, there are six county-maintained roads, Wyoming State Highway 70, three telephone lines, and two powerlines.

Wyoming State Highway 70 is a paved, two-lane, secondary highway running eastward from Baggs through the Little Snake River Valley. Average daily traffic (ADT) east of Baggs is 340. State Highway 70 continues eastward over the Sierra Madres to Encampment, Wyoming, as a gravel surface forest highway. This portion is closed during the winter months. Wyoming State Highway 789 and Colorado State Highway 13 is the major north-south road. It connects with Wyoming State Highway 70 at Baggs. ADT between Baggs and I-80 is 700, and ADT between Baggs and Craig, Colorado, is 1,400.

Affected Environment

There are four major highways in the region that would carry workers and supplies to the proposed Savery mine from surrounding settlement areas. Wyoming State Highway 789 from Creston Junction to Baggs, Wyoming, is a two-lane, rural route of generally straight alignment, approximately 51 miles in length. I-80 from Rawlins to Creston Junction, Wyoming, is a four-lane, divided highway, the major east-west highway route in southern Wyoming. This segment is approximately 25 miles in length. Wyoming State Highway 789 and Colorado State Highway 13, a two-lane, rural route, follows a northerly alignment from Craig, Colorado, to Baggs, Wyoming, approximately 41 miles in length.

Commuting distances from various communities to the mine area are given below:

Rawlins, Wyoming	91 miles
Wamsutter, Wyoming	80 miles
Baggs, Wyoming	15 miles
Dixon, Wyoming	8 miles
Savery, Wyoming	3 miles
Craig, Colorado	56 miles

A two-lane, dirt road provides access from Savery, Wyoming, to the proposed surface facilities, a distance of approximately 3 miles. This road would have to be paved and its alignment improved prior to the start of construction of mine facilities.

Impacts resulting from employment and population increases are projected from settlement patterns given in the Socioeconomic section of this document. Each person employed at the Savery mine probably would generate two auto trips per day (one commute trip each way) and all other population increases (induced, indirect, and general population) would generate .8 auto trips per day. Traffic mix (i.e., trucks versus cars) and traffic increases within corporate limits have not been estimated.

Environmental Consequences

Development Alternative. If coal were developed from the Savery PRLAs, three categories of improvements would be required on local transportation systems:

1. A system of roads and conveyors to transport workers, equipment, and coal to the surface facilities in the south area would be built, if coal were developed in the northeast area and northwest area.
2. A rail transportation system would be constructed to carry coal from the mine facilities to existing rail lines.
3. Road design improvements and increased road maintenance costs would occur from population increases resulting from mine and related employment.

Mining Operations Transportation Systems. If 4 MTY of coal were produced from the Savery PRLAs, no transportation system would be required beyond local service and maintenance roads. However, if 7 MTY were produced, a system of roads and conveyors to transport workers, equipment, and coal between the two northern areas and the southern area would be required. Road and conveyor systems would parallel each other from the northern area to the southern area (approximately 6 miles). The required width to accomodate both systems would be 75 feet; consequently, 54.55 acres would be required for these two systems.

Rail Transportation System. A rail system to transport coal to markets outside the region would

be required. General design characteristics of the rail line include:

1. Single track with major sidings every 10 to 20 miles.
2. Right-of-way width of 150 feet.
3. Maximum grade of 1 percent, maximum curvature of 3 percent.
4. The average unit train would consist of 110 cars, each having a capacity of 100 tons.

Two possible routes, A and B, from the Savery PRLAs to existing rail lines are being evaluated. Route A would leave the surface facilities and travel along Savery Creek. The line would turn west at the Little Snake River and follow the river to Wyoming State Highway 789 at Baggs. The line would then turn north and follow the general alignment of the state highway to where it would join with the Union Pacific main line at Creston Junction, Wyoming.

Route B would leave the surface facilities and travel along Savery Creek. The line would turn west at the Little Snake River and follow it to Wyoming State Highway 789 at Baggs. The line would then turn south and follow the general alignment of the state highway into Colorado where it would join with the Rio Grande main line at Craig, Colorado.

Although 10 miles shorter in length, Route B would require rail crossings at the Little Snake River, four minor streams, Wyoming State Highway 70, and U.S. Highway 40 in Craig. Route A would require fewer stream crossing and could, therefore, be about as cost effective as Route B.

Highways. Under the 4 MTY scenario, Wyoming State Highway 70, Colorado State Highway 13, and Wyoming State Highway 789, would receive the greatest increase in use because of the Savery project. Major reconstruction of Wyoming State Highway 70 would be necessary as ADT increases attributable to the Savery project would range between 392 and 423 percent (from 2,728 to 2,877 ADT) in the peak year, 1999. Highway widening projects would be necessary on Wyoming State Highway 789 and Colorado State Highway 13 as ADT increases attributable to the Savery project are projected at 40 and 65 percent.

Under the 7 MTY scenario, highways would be impacted in the same order as the 4 MTY scenario. Those improvements indicated under the 4 MTY scenario would be the same for this scenario, with the exception of possible reconstruction of part of Colorado State Highway 13.

No Development Alternative. If coal were not developed from the Savery PRLAs, changes to the local transportation systems would not be required. Increased regional highway traffic, because of energy development and related population, is not expected to place highway use beyond acceptable service levels.

Irreversible and Irretrievable Commitments of Resources

All capital investments for transportation would be an irretrievable commitment of funds.

All transportation systems built would be an irreversible commitment of resources.

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COORDINATION WITH OTHER AGENCIES

The following agencies were consulted or expressed interest in the Savery PRLAs.

Federal

U.S. Department of Agriculture
- Forest Service

U.S. Department of Interior
- Fish and Wildlife Service
- Minerals Management Service
- Office of Surface Mining

State

Department of Environmental Quality
Wyoming Game and Fish Department
Wyoming Highway Department

Local

Baggs City Council
Carbon County Planning and Development
Dixon City Council
Rawlins City Council

PUBLIC PARTICIPATION

The following organizations, companies, and individuals were consulted or expressed interest in the Savery PRLAs.

Organizations

Carbon County Economic Development Association
Wyoming Outdoor Council

Companies

Arch Mineral Corporation
Daily Times
Gulf Mineral Resources Company
Snake River Press
Valley Cable TV

Individuals

Kate Dupont
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Carl A. Gaensslen
E. Robert Grieve
James Medina
- Office of U.S. Senator Alan K. Simpson

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GLOSSARY

ALLUVIAL VALLEY FLOOR. A stream or river valley containing recently deposited, unconsolidated materials (alluvium) in its stream bed or associated floodplains. Such areas are often subirrigated by water within the alluvium.

AQUIFERS. Rock or unconsolidated material below the surface of the earth that is capable of holding, transporting, and, if tapped, supplying water.

AS-RECEIVED ANALYSIS. The physical or chemcial composition of a material as it is found or as it is produced.

DATA ANALYSIS UNIT. Refers to a big game herd unit. All individuals of a given species in a data analysis unit (DAU) constitute a population. There is little interchange of animals between DAUs.

DISSOLVED SOLIDS. Chemical compounds that have dissolved in a liquid medium.

DRAWDOWN. The amount of drop in the local water table around a well.

FINAL SHOWING. One of the requirements of processing PRLAs that must be provided by the applicant. The final showing consists of the estimated costs of mining the coal given the stipulation measure.

HYDROLOGICAL CONNECTION. Two separate groundwater systems that have enough intermixing so that one system can affect the other one in quality, quantity, etc.

INITIAL SHOWING. One of the requirements for processing a PRLA that must be provided by the applicant. The initial showing consists of: (1) coal quantity and quality data; (2) the location of proposed development and mining operations; and (3) mining method.

PERCHED AQUIFERS. An aquifer containing unconfined groundwater separated from an underlying main body of groundwater by an unsaturated zone.

RIPARIAN. Pertaining to the bank or shore of a river, lake, or stream.

ROOM AND PILLAR TYPE UNDERGROUND MINING. A mining method in which a portion (generally 50 percent) of the coal is left in place to support mine roof after the excavation of the other portion of the coal. The coal left in place resembles large supporting pillars.

SEDIMENT YIELDS. The amount of material eroded from the land surface and delivered to a stream system.

SUBSIDENCE. The lowering of the strata, including the surface, due to underground excavations.

UNGULATES. Hooved, vegetation-eating mammals.

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